NAUTICAL AND ASTRONOMICAL TABLES

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Tables
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TABLES

FOR THE USE OF

NAUTICAL MEN, ASTRONOMERS AND OTHERS;

INTENDED PARTICULARLY AS

SUPPLEMENTARY

TO

THE NAUTICAL ALMANAC,

AND

WHITE'S CŒLESTIAL ATLAS.

Gilbert

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Erratum.—At the top of the columns in Table VI., ° ′ should be ′ ″.

EXPLANATION OF THE TABLES.

TABLE I.

Depression, or Dip of the Horizon.

In observing altitudes at sea, the image of the object is brought down to the visible horizon: but, on account of the convexity of the earth's surface and the elevation of the observer's eye above it, a line drawn from his eye to the visible horizon, or to the water's edge, will obviously fall below the true horizontal line through the eye of the observer. It follows, by bringing the image down to the former line, instead of the latter, that it is brought too low and the altitude is thereby made too great; the more so, the higher the observer is raised above the level of the sea. The quantity of this error, for each height of the eye up to 100 feet, is given in the table, and is to be taken out with the height of the observer's eye in feet. For extreme cases, the table may be applied as far as 400 feet by entering it with one-fourth of the height of the eye, and then taking double the quantity for the required dip.

It will be seen that the correction for dip is always to be *subtracted* from the observed altitude.

TABLE II.

Sun's Parallax in Altitude.

The parallax of an object is the distance between its place in the heavens, as seen by the observer from the surface of the earth, and that in which it would be seen from the earth's centre, which latter is usually called its *true place*, and is that which is given in the Nautical Almanac and White's Ephemeris. On this account all objects, out of the zenith, appear lower than they really are; and the amount of this correction depends jointly on the distance of the object from the centre of the earth, and its altitude above the horizon; consequently, when the distance of the object is continually the same, or nearly so, as is the case with the sun, it will depend wholly on its altitude; being greatest when the sun is in the horizon, where it is about 9″,

and lessening gradually as the altitude increases, until it arrives at the zenith, where it vanishes.

The correction of the sun's altitude is to be taken out with the sun's *apparent* altitude, and is always to be *added* to the apparent altitude to obtain the true altitude.

TABLE III.

Augmentation of the Moon's Semidiameter.

It is well known that objects appear greater or less, as they are at a less or greater distance from the observer; consequently, as the moon is nearer to the observer by a semidiameter of the earth when she is in the zenith than when she is in the horizon, and as the earth's semi-diameter bears a sensible proportion to the moon's distance from its centre, the semidiameter of the moon must appear greater to a spectator on the earth's surface, when she is in the zenith than when she is in the horizon: the augmentation which depends on her altitude, is contained in Table III., and is to be *added* to her horizontal semidiameter, found in the Almanac, for the given time.

TABLE IV.

Dip of the Sea at different Distances from the Observer.

The numbers in Table I. express the dip of the visible horizon, below the true, when it is entirely open, and free from all obstructions, such as land or other objects. It frequently happens, when ships are running along shore, where an observation may be very desirable, that the sun is over the land at the time when an altitude is wanted; and in that case the dip will be different from what it would otherwise have been, and greater, the nearer the ship is to that part of the shore to which the sun is brought down. The Table is to be entered at the top with the height of the eye above the surface of the sea in feet, and in the left hand column with the distance of the ship from the land in sea miles; and, directly under the former, and opposite to the latter, will be found the dip of that point in minutes; which is to be *subtracted* from the observed altitude instead of the numbers in Table I.

TABLE V.

Contraction of the Semidiameter of the Sun or Moon.

The effect of refraction being greater on the lower limb than on the upper limb, the apparent vertical diameter of the sun or moon is in consequence less than the apparent horizontal diameter by a quantity which is equal to the difference of the refractions of the upper and lower limbs, and which becomes sensible, and therefore necessary to be taken into account, at low altitudes.

When lunar distances are observed, the correction should be ascertained and applied to the semidiameter of the sun or moon in all cases when its altitude is less than 15°. But if the altitudes should be nearly equal, the correction will not amount to anything, because the horizontal semidiameter will then be employed. If the objects should be both in the same vertical or azimuth circle, a semidiameter drawn from the centre to the part of the limb from which the distance is taken, will make an angle of 90° with the horizon, and will be diminished by the whole amount of the difference between the refraction of the centre and the refraction of the limb. In all cases the "*Angle with the Horizon*" may be roughly estimated by noticing the inclination of the plane of the sextant with the horizon when the distance is observed. This angle is to be found in degrees at the top of the table, and the apparent altitude in the left hand column: the correction will then be found at the intersection of the vertical and horizontal lines of the table, and is always to be *subtracted* from the semidiameter.

TABLE VI.

Refraction in Altitude.

The rays of light are bent out of their rectilineal course when they pass obliquely out of one medium into another of a different density; and if the density of the latter medium gradually increases, the rays will be bent more and more from their first direction, so as to approach the direction of the line which is perpendicular to the surface or stratum of the medium on which they fall. This phenomenon is called the refraction of light, and it causes all the heavenly bodies to appear higher, or at greater altitudes than they otherwise would do. The amount of this refraction depends on the altitude, and on the state of the atmosphere through which the observation is made; and it is to be taken from the table according to the following rule:—

Rule.—From the height of the barometer in inches and tenths, subtract *one-tenth* of the number of degrees' temperature on Fahrenheit's thermometer. Enter the top of the table with the difference, and the left-hand column with the apparent altitude, and the refraction will be found in the intersection.

It is in all cases to be *subtracted* from the observed altitude. When the altitude is above 8°, as it should always be in practice, it will be sufficient to enter the table at the top with the nearest whole number of the difference.

Example.—Suppose the apparent altitude corrected for dip to be 15° 25′; height of the barometer 29.8 inches, and the temperature of the thermometer 61°.

Barometer	29.8
One-tenth of thermometer . .	6.0
Difference .	23.8

the nearest whole number to this difference is 24; the refraction is, therefore, to be taken out of the column headed 24; and the altitude falling midway between 15° 20′ and 15° 30′ in the table, the required refraction is 3′ 23″.

This method will be found quite near enough in general practice; but, if greater accuracy be required, it will be necessary to use the exact difference, 23.8, and to proportion the refraction between the 23 and 24 columns of the table. Thus:—

23 column gives	3′ 18″	Diff. 5″.
24 „	„ 3′ 23″	

The difference 5″ multiplied by .8 gives 4″ to be added to 3′ 18″; and the correct amount of refraction is therefore 3′ 22″.

If no barometer or thermometer is at hand, the *mean refraction* must be employed; that is, the refraction answering to the mean temperature (50°) and mean pressure (30 inches) of the atmosphere. In this case we must have recourse to the middle column of the table, headed 25; and to facilitate a reference to this column, it is enclosed between thick rules or vertical lines in the table. *Example.*—For apparent altitude 15° 25′, the *mean* refraction is 3′ 29″.

TABLE VII.

Correction of the Moon's Apparent Altitude.

This table contains the parallax in altitude diminished by the mean refraction given in the preceding table: the former causes the moon to appear lower, and the latter causes her to appear

higher, than her true place, as she would be seen from the earth's centre; and the correction shown in the table is therefore the joint correction for parallax and mean refraction.

The table should be entered in the column under the minute of horizontal parallax as given at the top, and proportioned for the moon's apparent altitude on the left, which may be easily done at sight: for this purpose the rough exercise of judgment will be quite sufficient. The parts for the seconds of parallax should then be taken from the right-hand part of the table, opposite the tens of seconds and under the units, and should be added to the former to get the complete correction.

Example.—Let the moon's apparent altitude be 28° 25′, and the horizontal parallax 60′ 44″.

Alt. 28° 25′ in 60′ column gives . .	50′ 58″
Prop. parts for 44″ of parallax . .	39
Required correction .	51 37

It should be observed, that when the parallax falls between 53′ and 54′, as it sometimes does, the 54′ column must be used, and in that case the proportional part from the right-hand table for the seconds of difference between the given horizontal parallax and 54′ is to be *subtracted* from the correction previously taken out, because the parallax is then so many seconds less than 54′, instead of being greater.

Example.—Let the altitude be 36° 24′ and the horizontal parallax 53′ 15″, which is 45″ less than 54′.

Alt. 36° 24′ in 54′ column gives . .	42′ 9″
Prop. parts for 45″ of parallax . .	0 36
Correction .	41 33

The correction so determined from the table is in all cases to be *added* to the moon's *apparent* altitude, or the observed altitude first corrected for dip and adjustment, to get the *true* altitude.

TABLE VIII.

Proportional Logarithms.

This table, which contains the difference between the logarithm of each interval of time under three hours and the logarithm of three hours, was first calculated by Dr. Maskelyne in order to simplify the comparison of a reduced lunar distance with those printed in the Nautical Almanac for every third hour of Greenwich time. The table has also been made applicable to arcs for each second up to 3°, and is very usefully employed in almost all calculations which relate to small sexagesimal quantities.

The table is to be entered with the hours and minutes, or with the degrees and minutes, as the case may be, at the top, and the seconds in the left-hand column. Examples:—The proportional logarithm of 0° 13′ 52″ or of 0h. 13m. 52s. is 1·1133; and the proportional logarithm of 2° 54′ 36″ or of 2h. 54m. 36s. is 0132.

TABLE IX.

Logarithmic Sines, Tangents, and Secants.

The logarithmic sines, tangents, and secants, are here printed to five places of figures, which, by the adoption of the methods given in this volume, will be found to be fully adequate to every purpose in Nautical Astronomy, and to give results quite as correct as when more figures are employed in the calculation. It is unnecessary to describe the mode of using the table, as a few examples will be quite sufficient, and best serve the purpose of explanation.

The log. sin. of	...24°	36′ is	9.61939
The log. cos. of	..38	40 is	9.89254
The log. cosec. of	..32	28 is	10.27018
The log. sec. of	56	30 is	10.25811

9.71740 is the log. tan. of	.....27°	33′
10.03152 is the log. sec. of	21	34
9.81968 is the log. cot. of	56	34

TABLE X.

Natural Sines.

This table, which will be found useful, on many occasions, does not require any explanation, the arrangement being on the same principle as Table IX.

TABLE XI.

Logarithms of Numbers.

This Table contains the logarithms of numbers to five places of figures, and is arranged on a similar plan to the usual large tables of logarithms to seven figures. In the first column of each page are the first three figures of the number; and along the top and bottom of the columns the fourth figure is to be found, in which columns all the logarithms are inserted. It is necessary to observe, that the first two figures of each logarithm are always to be found at the beginning of the lines in the first

column of logarithms, marked 0 at the top and bottom; and that the two figures so placed are common to all the logarithms that follow them until we come down to the next leading figures. When the leading figures change it will be observed that the three figures of the logarithm drop down to the next line, and are connected by means of hyphens to the new leading figures to which they properly belong.

In the right hand column of the table under "Diff." small tables are inserted, showing the proportional parts, or the correction to be added to the logarithm for the fifth figure of the number, which correction is usually applied at sight. The difference between the logarithm in the table and the next consecutive one in the same horizontal line is to be found at the head of the small marginal table, and then the proportional part to be added to the logarithm will be found opposite the fifth figure of the number.

A few logarithms taken out in this way will readily suggest the inverse operation of finding the natural number answering to any proposed logarithm.

In taking out logarithms from the table the index must be prefixed by the calculator, and is always an *unit* less than the number of integral digits or figures in the natural number, according to the usual rule; or, in other words, the index is one less than the number of figures on the left of the decimal point.

Examples:—

The logarithm of .....860.2 is 2.93460
The logarithm of ..... 89.13 is 1.95002
The logarithm of .....196.46 is 2.29327

The number answering to .....3.31148 is 2048.7
The number answering to .....1.52006 is 33.118

TABLE XII.

Diurnal Logarithms.

Table VIII. contains proportional logarithms, calculated on an interval of three hours, and they are sometimes called "Proportional Logarithms for Three Hours." The logarithms in the present Table are analogous to those of Table VIII., and are, in fact, "Proportional Logarithms for 24 Hours." They are here called "Diurnal Logarithms" because they are constructed on an interval of 24 hours, or "one day," and because they are particularly serviceable for proportioning between quantities given for daily intervals, such as the sun's declination, the sun's right ascension, &c., which, in the Nautical Almanac and White's Ephemeris, are given for every day at noon.

In calculation the logarithms are merely copied out of the table.

TABLE XIII.

Reduction of the Time of the Moon's Passage over the Meridian of Greenwich to the Time of her Passage over any other Meridian.

As the moon passes the meridian of Greenwich later every day than she did the day before by a number of minutes, it follows that the moon must pass the meridian of places that lie to the westward of Greenwich later, and the meridians of places to the eastward of Greenwich sooner than she passes the meridian of Greenwich.

The "daily variation of the moon's passing the meridian" is to be found by taking the difference between the time of the moon's transit on the proposed day and the *day following*, if the longitude be *West;* or between the time of her transit on the proposed day and the *day preceding*, if the longitude be *East.*

It is obvious that from transit to transit again at Greenwich the moon must pass all the intermediate places gradually later and later, by a proportional part of this "daily difference;" and that the "daily difference" itself applies to the whole circumference, or to a difference of longitude equal to 360° in arc, or 24h. in time. The Table shows the amount of the correction for each daily variation, inserted at the top and bottom, and for the proposed longitude in degrees or time, to be found in the left or right-hand side column; and when taken from the Table, it is to be applied to the time of transit at Greenwich, according to the precept given at the foot of the Table.

TABLE XIV.

Most favourable Altitudes for determining the Apparent Time.

This Table is designed to direct the observer to the time of taking an altitude, so as to calculate the apparent time with the most accuracy, and is constructed on the principle that a given small error in the observed altitude shall cause the least possible amount of error in the calculated time. It should be remarked, however, that other circumstances must necessarily enter into the consideration; that an altitude should be favourable to the observation as well as to the calculation; and that the Table ought to be used as a general guide only, and not as an absolute rule.

TABLE XV. *a* and *b*.

Difference of Latitude and Departure.

These Tables are of extensive use in navigation, and are

commonly called *Traverse Tables*, being generally employed in the working of a traverse.

Table XV. *a* is to be used when the course is reckoned by points of the compass; and Table XV. *b* is to be used when the course is more accurately estimated in degrees of the circumference.

With the arrangement given to the Tables, the difference of latitude and the departure must be separately applied for the units or last figure of the distance; thus, if the distance be 247 miles, the number answering to 240 miles must be increased by that answering to 7 miles.

Example.—Let the course be 32° and the distance 258 miles.

	Diff. Lat.	Dep.
With Dist. 250 miles we find .	212.0	132.5
„ 8 „ .	6.8	4.2
Required values . .	218.8	136.7

In practice the correction for the units, in this way, can be easily applied at sight.

TABLE XVI.

Meridional Parts.

This Table is generally employed in working the different cases in *Mercator's Sailing*, and it is also used in the construction of sea and other charts which are usually laid down on Mercator's projection. When the extension of the degrees of latitude are made to correspond to the differences of the numbers given in this Table estimated as minutes of a degree, all places so laid down will preserve the same relative bearings and distance as they have upon the surface of the earth, considered as a sphere. The Table is therefore useful in all calculations which relate to the bearings and distances of places.*

TABLE XVII.

Sun's True Amplitude.—For determining the Variation of the Compass.

In this Table the amplitude is reckoned from the east or west points of the horizon; and in its practical application the nearest degree will usually be sufficient.

* A meridional part may be calculated as follows:—To one-half of the latitude add 45°, and multiply the number 7915.7 by the logarithmic tangent of the sum, observing to omit 10 in the index.

TABLE XVIII.

Augmented Refractions.

The arrangement of this Table is the same as that of Table VI., and its principal use is to be found in the method of clearing a lunar distance given at page xxii.

TABLE XIX.

Correction of Parallax on a Lunar Distance.

This Table is also used in the operation of clearing a lunar distance. (Problem V.)

TABLE XX.

Semidiurnal Arcs for each degree of Latitude.

This Table serves to calculate the times of the rising and setting of the sun and stars at any place whose latitude is known.

TABLE XXI.

Semidiurnal Arcs for the Latitude of Greenwich.

MOON.

This Table is designed for the calculation of the time of the moon's rising and setting, and includes allowances for mean horizontal refraction and parallax. A Table is adjoined showing the correction to be added to the semidiurnal arc on account of the meridional retardation which causes the moon to occupy a longer interval of time than the sun, in passing over the calculated horary angle.

The increased semidiurnal arc should be ascertained for that declination of the moon which belongs, as nearly as practicable, to the time of the calculated rising or setting, as the case may be; and it is applied in the usual way, viz.—

subtracted from / added to } the time of transit for the time of { rising. / setting.

TABLE XXII.

Semidiurnal Arcs for the Latitude of Greenwich.

SUN AND STARS.

This Table is of the same nature as Table XX., and is adapted to the latitude of Greenwich.

TABLE XXIII.

Reduction of the Moon's Horizontal Parallax and Semidiameter to any given Greenwich Time.

This Table shows the proportional parts to be applied to the moon's horizontal parallax and semidiameter for noon and midnight in order to reduce them to the time of observation, and they must be added or subtracted according as the quantities in the ephemeris are increasing or decreasing.

TABLE XXIV.

Joint correction of an observed Altitude of the Sun's Lower Limb for Dip, Refraction, Parallax, and Semidiameter.

This Table which, for nautical purposes, is intended to simplify the operation of correcting the sun's altitude, first assumes the semidiameter to be 16′, and a correction on account of the semidiameter, for each month of the year, is inserted at the foot.

TABLES XXV., XXVI., and XXVII.

For deducing the Time of High Water at London Bridge.

These Tables have been calculated according to the theory of Laplace, and are to be used as follows :—

From the ☽'s semidiameter, to the tenth of a minute, diminished by Table XXV., subtract the ☉'s diminished semidiameter, Table XXVI., and note the *remainder* with its proper algebraic sign.

With the time of the moon's transit take out the "principal correction" from Table XXVII., and multiply the "factor" found in the adjoining column by the remainder for the second correction. Then the principal correction being added to the time of transit, and the second correction applied according to its algebraic sign, the result will be the time of high water at London Bridge.

The time of high water at any other place can at once be deduced from that at London Bridge by the usual correction, or Table XXVII. can in this way be easily adapted to any place where the time of high water on the full and change of the moon is known.

TABLES XXVIII. to XXXV.

These Tables are necessary in the calculation of the various phenomena of eclipses of the sun, and moon, &c.; and their

use is fully exhibited in the Appendix to White's Ephemeris for the Year 1839.

Tables XXVIII., XXIX., XXXIV., and XXXV. are also required in various astronomical calculations.

TABLE XXXVI.

Sidereal Equivalents to Mean Time.

This Table is principally used in deducing the sidereal time, or the right ascension of the meridian, and is therefore much required in calculations which relate to the fixed stars, &c.

TABLE XXXVII.

Divisors for obtaining the Correction on account of Second Differences.

In interpolating quantities from an ephemeris, such as the sun's right ascension and declination, the moon's right ascension and declination, &c., and in various astronomical and other calculations where the successive first differences are not sufficiently uniform, it becomes necessary to apply a correction for second difference, if minute accuracy be required. Table XXXVII. shows the number by which the second difference should be divided to obtain the required correction. In most calculations this can be done at sight, and the nearest whole number of the divisor is generally sufficient.

To meet the various cases the divisors are given for three successions, viz. *Units*, *Days*, and *Hours*. For the interpolation of quantities given at every noon and midnight, where the succession is 12 hours, Table (*b*) may be entered with one-half of the interval to get the requisite divisor; and Table (*a*) can be used on any occasion, by first ascertaining the value of the interval in decimal parts of the whole interval of the succession.

TABLE XXXVIII.

Useful Numbers.

Table XXXVIII. contains a list of useful numbers with their logarithms, &c., which have been carefully deduced from the latest and best authorities; and it will be found a most convenient reference to such persons as may be engaged in scientific calculations.

NAUTICAL PROBLEMS.

It will in all cases be found most convenient to reckon time according to the *astronomical day*, which invariably commences at *noon*. Thus, on January 6, at three o'clock in the afternoon, the astronomical time is Jan. 6d. 3h.; at midnight it is Jan. 6d. 12h.; and at three o'clock in the morning, on Jan. 7, the time is Jan. 6d. 15h., being 15 hours from the noon of Jan. 6. By giving this point a little consideration, the computer will easily understand that in the *mornings* the time by his watch must be increased by 12 hours, and attached to the day *preceding*.

Apparent time is reckoned from apparent noon; that is, from the instant the sun is upon the meridian of the place. The time shown on a sun-dial, and the time deduced from an altitude of the sun, are apparent times.

Mean time is the time that should be shown by a chronometer, or by a clock when properly adjusted, and differs from apparent time by an interval called the *Equation of Time*, regularly printed on pages 1 and 2 of the Nautical Almanac, and on the left hand pages of White's Ephemeris.

In White's Ephemeris, when the equation of time is "clock bef. ⊙," it is to be added to apparent time, or subtracted from mean time; and when "clock aft. ⊙," it is to be subtracted from apparent time, or added to mean time.

PROBLEM I.

At any given time and place to find the corresponding time at Greenwich.

Rule.—Reduce the longitude of the place into time, reckoning 15° to the hour, which is most simply done by multiplying by 4, and then changing the degrees to minutes, and the minutes to seconds of time. This being written under the

given time, viz., the day of the month, with the hours, minutes, and seconds,

$$\left.\begin{matrix}\text{add}\\ \text{subtract}\end{matrix}\right\} \text{if the longitude be } \left\{\begin{matrix}\text{west}\\ \text{east}\end{matrix}\right.$$

the result will be the time at Greenwich ; and whether apparent or mean, will be determined by the given time at the place, being of the same kind.

Example.—On August 3, in longitude 85° 16′ W., the apparent time is 3h. 42m. 28s. P.M. Required the time at Greenwich.

°	′		d.	h.	m.	s.	
85	16	App. time at place Aug. ...	3,	3	42	28	
	4	Longitude in time.....		5	41	4	W.
5h.	41m.	4s.	App. time at Greenwich, Aug.	3,	9	23	32

Had the longitude been east instead of west it would have been subtracted, and the required time would have been Aug. 2d. 22h. 1m. 24s., where the astronomical day is changed. If the *mean* time at Greenwich be required, it will be necessary further to apply the " Equation of Time" as before directed.

PROBLEM II.

To find the Apparent Time from an observed Altitude of the Sun, and thence the error of the Watch.

Rule.—Correct the sun's altitude for dip, refraction, parallax, and semidiameter: the lower limb being observed, this can be most readily effected by means of Table XXIV.

Subtract the sun's declination from 90° when the latitude and declination are of the same name, that is, both north or south ; or add it to 90° when they are of contrary names, and the sum or remainder will be the sun's polar distance.

Add together the sun's corrected altitude, the polar distance, and the latitude of the place of observation ; take the difference between half their sum and the corrected altitude, and note the remainder.

Then add together, from Table IX,

The Co-secant of the polar distance,
The Secant of the latitude,
The Co-sine of the half sum,
And the Sine of the remainder.

Half the sum of these will be log. Sine of an arc, which, multiplied by 8, will give the sun's distance from the meridian, or the apparent time from noon of the place, when the observation was made.

Example.—On June 5, 1841, in latitude 31° 16′ N., and estimated longitude 81° 10′ W., at 4h. 49m. 30s. P.M., the altitude of the sun's lower limb is 25° 47′; the height of the eye above the level of the sea being 20 feet. Required the error of the watch.

Observed alt. ⊙'s lower limb	25°	47′.0
Joint correction Table XXIV.		9.7
Corrected alt. ⊙'s centre	25	56.7

	h.	m.	s.
Time by watch	4	49	30
Longitude in time	5	24	40 W.
Corresponding Greenwich time	10	14	

Diurnal log. 3702 Tab. XII.
June 5, ⊙'s dec. 22° 34′ 9″ N. daily diff. +6′ 22″ ,, 5763 ,,

2 43 9465

22 36 52 N. ⊙'s dec. at the time of observation.
90

67 23 8 Polar distance.

It will seldom, however, be necessary to take out the sun's declination nearer than the minute, and this may easily be done by inspection. In the present example we shall, therefore, only use the nearest minutes for taking out the logarithms.

Corrected altitude....	25°	57′		
Polar distance.....	67	23	Co-secant ..	0.03475
Latitude.....	31	16	Secant.....	0.06816
Sum	124	36		
Half sum	62	18	Co-sine....	9.66731
Remainder	36	21	Sine	9.77285
				2)19.54307
Arc.....	36	13	Sine	9.77153
		8		

App. time ..... 4h. 49m. 44s.
Time per watch. 4 49 30

Watch too slow..... 14 seconds.

The calculator will observe that the 10 is omitted in taking out the co-secant and secant.

Note.—If a star is observed, the calculation will be just the same, and the result will be the star's distance from the meridian. In this case to deduce the apparent time, it will be necessary finally to add the star's right ascension, and then to subtract the sun's right ascension.

PROBLEM III.

To find the Latitude from an observed Meridian Altitude of the Sun's lower limb.

Rule.—Correct the observed altitude by Table XXIV.; subtract it from 90°, and the remainder will be the zenith distance, which must be marked N. if the zenith was *north* of the sun, or S. if the zenith was *south* of the sun at the time of observation.

If the zenith distance and the sun's declination be of the same name, add them together; but if one be north and the other south, subtract the less from the greater; and the sum, or difference of the same name with the greater, will be the latitude required.

Example.—The height of the observer's eye being 24 feet, and the zenith being north of the sun, suppose the altitude of the sun's lower limb to be 63° 28′, and his declination, reduced to the time of observation, 18° 32′ N. Required the latitude.

	°	′	
Observed alt. ⊙'s lower limb	63	28	
Correction Table XXIV.		11	
True altitude	63	39	
	90	0	
Zenith distance	26	21	N.
Sun's declination	18	32	N.
Latitude	44	53	N.

Had the zenith been south of the sun, the calculation would have been—

	°	′	
Zenith distance	26	21	S.
Sun's declination	18	32	N.
Latitude	7	49	S.

With a star or the moon the operation is just the same, the only difference being in the correction of the altitude, and the taking out of the declination, and the calculation may be extended to seconds, &c., if desired; but the above is quite sufficient for sea purposes.

PROBLEM IV.

To find the latitude from two observed altitudes of the Sun, near to each other, and out of the meridian, the interval of time between the two observations being also taken.

Rule.—The altitudes being first corrected, take their difference, and add the half of this difference to the less altitude to get the *mean* altitude.

From the proportional logarithm (Table VIII.) of the observed interval of time, subtract the proportional logarithm of the difference of the altitudes. To the remainder add the constant logarithm 8.8239, and the log. secant of the declination; the sum will be the log. sine of an arc; seek out the nearest arc in the Table, write down the corresponding log. secant, and subtract it from the log. co-tangent of the mean altitude. The difference will be the tangent of an arc A, which must take the same name as the declination, if the Pole and the Zenith are on the same side of the Sun, and a different name if the Pole and Zenith are on different sides of the Sun.

If the arc A and the declination be of the same name, add them together; but if of different names, subtract the less from the greater; and the sum, or difference of the same name with the greater, will be the augmented latitude.

Lastly, add together—

The log. sine of the mean altitude,
The log. secant of the arc A,
And the log. sine of the augmented latitude;

and the sum, rejecting tens in the index, will be the log. sine of the required latitude.

Example.—Let the altitudes corrected for dip, refraction, parallax, and semidiameter be 56° 12′ 52″, and 56° 35′ 40″, the interval between the observations being just 10m. 0s., and the Pole and Zenith on the same side of the Sun; and suppose the declination to be 11° 46′ N.

	°	′	″
Greater altitude	56	35	40
Less altitude.....	56	12	52
Difference.....	0	22	48
Half difference.....	0	11	24
Mean altitude.....	56	24	16

	m.	s.				
Interval....	10	0	Prop. log.....	1.2553		
Diff. alts. ..	22	48	,, ...	0.8973		
				0.3580		
			Const. log.	8.8239		
Declination	11°	46′ N.	...log. sec....	92		
			log. sin....	9.1911		
			log. sec....	0.00530		
Mean alt....	56°	24′	log. cot....	9.82243	log. sin...	9.92060
Arc A.....	33	17 N.	log. tan....	9.81713	log. sec...	0.07781
Aug. lat....	45	3 N	.....		log. sin.	.9.84986
			Required latitude 44° 50′ N.....		log. sin.	.9.84827

This method of determining the latitude will be found to be very simple and expeditious; and it applies equally to stars whose declinations are known, by using the constant logarithm 8.8227 instead of 8.8239; so that at all times, in clear weather, the latitude can thus be ascertained in a few minutes, with tolerable accuracy.

An interval of about 10 minutes is, perhaps, most favourable to the determination; and to avoid any doubt as to the name to be given to the arc A, it will be preferable if the object does not pass the meridian near the zenith.*

PROBLEM V.

The Observed Distance of the Moon from the Sun, or a Star, together with their observed altitudes, are given, to find their True Distance as it would appear from the centre of the Earth.

Rule.—From the moon's horizontal parallax subtract the reduction for latitude, as found in the following series:—

Lat.....	0°	13°	22°	28°	34°	39°	45°	50°	55°	61°	67°	76°	90°
Reduc.	0″	1″	2″	3″	4″	5″	6″	7″	8″	9″	10″	11″	

With the altitudes of the moon and star, corrected for dip, take out the "Augmented Refractions" from Table XVIII., observing, in case of the Sun, to deduct 9″. Subtract the moon's Augmented Refraction from the reduced horizontal parallax, and the remainder will be the *corrected parallax*.

In two separate columns write the log. sine, and the log. tangent of the observed distance of the centres (Table IX.); in the second line under each of these write the Prop. Log.

* Tables, &c., for deducing the latitude from an altitude of the Pole Star are given in White's Ephemeris, pages 44 and 45.

(Table VIII.) of the "corrected parallax;" and in the third line write the log. cosecant of the star's altitude, and the log. cosecant of the moon's altitude. The sums of these columns will then be the prop. logs. of two arcs, A and B.

Again, in the same columns write the prop. log. of the Sun or Star's augmented refraction. Under these, copy from the third line the log. cosecants of the altitudes, but reversed in their situation; and these two lines summed up with the first line will give the prop. logs. of two arcs, *a* and *b*.

Subtract the arcs *a* and *b* respectively from the arcs A and B that stand above them, and the remainders will be Corr. I. and Corr. II. To Corr. I. always write *sub.*: to Corr. II. write

$$\left.\begin{matrix} add \\ sub. \end{matrix}\right\} \text{if the distance be } \left.\begin{matrix} less \\ greater \end{matrix}\right\} \text{than } 90°,$$

which will, perhaps, be most easily remembered, if it be considered that its application by addition or subtraction is always such as to bring the distance towards 90°.

Corr. I. and Corr. II. are next to be added together, if both are marked *sub.*, or the less subtracted from the greater if, the first being marked *sub.*, the other be marked *add.*, and the result marked the same as the greater.

The principal correction of the distance will thus be obtained, and it must be *added* if marked *add*, or *subtracted* if marked *sub.*

To get the true distance a small Second Correction will be necessary, and is thus ascertained:—

Find, *to the nearest minute*, the sum of the corrections of the altitudes taken from Tables VI. and VII. for mean refraction: with this sum and the principal correction take out, under the distance in Table XIX., the two corrections for parallax; their difference will be the second correction of the distance, and it must be marked the same as Corr. II., and applied accordingly.

Example.—In latitude 47° S., the barometer indicating 29·6 inches, and the thermometer Fahr. 45°, let the observed distance, reduced to the centres, of the moon and a star be 51° 28′ 35″; the altitude of the moon's centre, corrected for dip, 12° 30′, that of the star 24° 48′, and the moon's equitorial horizontal parallax 56′ 21″. The True Distance is required.

Barom.	29·6
One-tenth of Therm. . . .	4·5
	25·1

We must therefore enter Table XVIII. in the column headed 25.

Hor. Par.....	56	21	Corr. ☽'s alt. .	50	23	Table VII.
Red. for lat. 47° ..		6	Corr. *'s alt. .	2	6	,, VI.
Red. Par.....	56	15	Sum (*a*).....	52	29	
Table XVIII. ☽'s Aug. Ref.	4	24	.... *'s Aug. Ref.	2	19	
Corrected Par....	51	51				

In the calculation we now use the altitudes and distance to the nearest minute.

Dist.	51°	28′	35″	log. sine.	9.8934	log. tan.		10.0991
Corr. Par.....	51	51		Prop. log.	5405	.....		5405
Log. cosec. ..*'s alt.					3773	log. cosec. ☽'s alt.		6647
A.	27′	48″			0.8112	B.	8′ 56″	1.3043
					1.8904			1.8904
					6647			3773
a	0	38			2.4485	*b*.	0 46	2.3668
Corr. I.....	27	10	*sub.*			Corr. II...	8 10	
Corr. II.....	8	10	*add*					
						(*a*) 52′ Table XIX....		18″
Princip. Corr.	19	0	*sub.*			..... ,, ...		3
	51	9	35			Second Corr....15		
Second Corr.		15	*add*					
	51	9	50	true distance.				

*** Tables VI., XVIII., XXI., XXV., XXVI., XXVII., and XXXVII., and the methods of resolving Problems IV. and V., have been drawn up by Mr. Woolhouse expressly for this work.

The Nautical Astronomer will not fail to observe that the too commonly neglected use of the Barometer and Thermometer, which is here much simplified, is of great importance, and cannot be omitted in many cases without considerable error.

TABLE I.

Depression, or Dip of the Horizon.

Height of the Eye.	Dip.
feet.	′ ″
1	0 57
2	1 21
3	1 39
4	1 55
5	2 8
6	2 20
7	2 31
8	2 42
9	2 52
10	3 1
11	3 10
12	3 18
13	3 26
14	3 34
15	3 42
16	3 49
17	3 56
18	4 3
19	4 10
20	4 16
21	4 22
22	4 28
23	4 34
24	4 40
26	4 52
28	5 3
30	5 14
35	5 39
40	6 2
45	6 24
50	6 44
60	7 23
70	7 59
80	8 32
90	9 3
100	9 33

TABLE II.

Sun's Parallax in Altitude.

⊙'s Alt.	Sun's Par.
°	″
0	9
10	9
20	8
30	8
40	7
50	6
55	5
60	4
65	4
70	3
75	2
80	2
85	1
90	0

TABLE III.

Augmentation of the Moon's Semidiameter.

☾'s Alt.	Aug.
°	″
0	0
5	1
10	3
15	4
20	6
25	7
30	8
35	9
40	10
45	11
50	12
55	13
60	14
70	15
80..90	16

TABLE IV.—Dip of the Sea at different Distances from the Observer.

Distance of Land in Sea Miles.	Height of the Eye above the Sea in Feet.							
	5	10	15	20	25	30	35	40
	′	′	′	′	′	′	′	′
¼	11	22	34	45	56	68	79	90
½	6	11	17	22	28	34	39	45
¾	4	8	12	15	19	23	27	30
1	4	6	9	12	15	17	20	23
1¼	3	5	7	9	12	14	16	19
1½	3	4	6	8	10	12	14	15
2	2	3	5	6	8	10	11	12
2½	2	3	5	6	7	8	9	10
3	2	3	4	5	6	7	8	8
3½	2	3	4	5	6	6	7	7
4	2	3	4	4	5	6	7	7
5	2	3	4	4	5	5	6	6
6	2	3	4	4	5	5	6	6

TABLE V.—Contraction of the Semidiameter of the Sun or Moon.

Apparent Altitude.	Angle with the Horizon.								
	90	80	70	60	50	40	30	20	10
° ′									
5 0	26	25	23	19	15	11	6	3	1
20	23	22	20	17	14	10	6	3	1
40	21	20	18	16	12	9	5	2	1
6 0	19	18	16	14	11	8	5	2	1
20	17	16	15	13	10	7	4	2	1
40	16	15	14	12	9	6	4	2	
7 0	15	14	13	11	8	6	4	2	
20	14	13	12	10	8	6	4	2	
40	13	12	11	10	8	5	3	2	
8 0	12	11	10	9	7	5	3	1	
9 0	10	9	8	7	6	4	2	1	
10 0	8	8	7	6	5	3	2	1	
11 0	7	7	6	5	4	3	2	1	
12 0	6	6	6	5	4	3	2	1	
14 0	5	5	4	4	3	2	1	1	
16 0	3	3	3	2	2	1	1		
20 0	2	2	1	1	1	1			
30 0	1	1	1	1	1				
40 0	1	1	1	1					
50..90									

The Depression, or Dip, is to be *subtracted* from the observed Altitude.

The Refraction in Altitude (Table VI.) diminished by the Sun's Parallax in Altitude is a correction likewise *subtractive* from the Sun's Apparent Altitude.

The Sun or Moon's Semidiameter should be diminished by the Contraction (Table V.) in cases of Lunar Observations, when the object is not far above the Horizon; but this correction is scarcely worth applying if the Altitude is above 15°.

TABLE VI.—Refraction in Altitude. [*subtractive.*]

Apparent Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																					
	20		21		22		23		24		25		26		27		28		29		30	
° ′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
0 0	28	41	29	48	30	57	32	7	33	19	34	32	35	46	37	2	38	19	39	38	40	58
10	26	59	28	2	29	6	30	11	31	17	32	25	33	34	34	44	35	56	37	9	38	23
20	25	31	26	29	27	28	28	28	29	30	30	33	31	37	32	42	33	48	34	56	36	5
30	24	10	25	4	25	59	26	55	27	52	28	50	29	49	30	49	31	51	32	54	33	58
40	22	54	23	44	24	36	25	27	26	20	27	14	28	9	29	5	30	2	31	1	32	1
50	21	45	22	32	23	20	24	8	24	57	25	47	26	38	27	30	28	23	29	18	30	14
1 0	20	43	21	26	22	10	22	55	23	41	24	27	25	14	26	3	26	53	27	44	28	36
10	19	45	20	25	21	6	21	48	22	30	23	13	23	57	24	42	25	29	26	17	27	6
20	18	49	19	27	20	5	20	44	21	24	22	5	22	47	23	30	24	14	24	59	25	45
30	17	58	18	33	19	9	19	46	20	24	21	3	21	43	22	23	23	4	23	46	24	29
40	17	10	17	43	18	17	18	52	19	28	20	5	20	42	21	20	21	59	22	39	23	20
50	16	24	16	56	17	29	18	2	18	36	19	11	19	46	20	22	20	59	21	37	22	15
2 0	15	42	16	13	16	44	17	16	17	48	18	21	18	55	19	29	20	4	20	40	21	16
10	15	4	15	33	16	3	16	33	17	4	17	35	18	7	18	40	19	13	19	47	20	21
20	14	28	14	56	15	24	15	53	16	22	16	52	17	22	17	53	18	25	18	57	19	30
30	13	54	14	21	14	48	15	15	15	43	16	12	16	41	17	11	17	41	18	12	18	43
40	13	23	13	49	14	15	14	41	15	8	15	35	16	3	16	31	17	0	17	29	17	59
50	12	54	13	19	13	44	14	9	14	34	15	0	15	27	15	54	16	21	16	49	17	17
3 0	12	26	12	50	13	14	13	38	14	2	14	27	14	52	15	18	15	44	16	11	16	38
10	12	0	12	23	12	45	13	8	13	32	13	56	14	20	14	45	15	10	15	35	16	1
20	11	35	11	57	12	19	12	41	13	4	13	27	13	50	14	14	14	38	15	2	15	27
30	11	13	11	34	11	55	12	16	12	38	13	0	13	22	13	45	14	8	14	32	14	56
40	10	51	11	11	11	31	11	52	12	13	12	34	12	56	13	18	13	40	14	3	14	26
50	10	31	10	50	11	9	11	29	11	49	12	10	12	31	12	52	13	14	13	36	13	58
4 0	10	12	10	30	10	49	11	8	11	27	11	47	12	7	12	28	12	49	13	10	13	31
10	9	54	10	12	10	30	10	48	11	7	11	26	11	46	12	6	12	26	12	46	13	6
20	9	37	9	54	10	12	10	30	10	48	11	6	11	25	11	44	12	3	12	23	12	42
30	9	20	9	37	9	54	10	11	10	29	10	46	11	5	11	23	11	42	12	1	12	20
40	9	5	9	21	9	37	9	54	10	11	10	28	10	46	11	4	11	22	11	41	12	0
50	8	50	9	6	9	22	9	38	9	54	10	11	10	28	10	45	11	3	11	21	11	39
5 0	8	35	8	50	9	6	9	22	9	38	9	54	10	11	10	28	10	45	11	2	11	19
10	8	21	8	36	8	51	9	7	9	22	9	38	9	54	10	10	10	27	10	44	11	1
20	8	8	8	23	8	38	8	53	9	8	9	23	9	39	9	55	10	11	10	27	10	44
30	7	56	8	10	8	25	8	39	8	54	9	9	9	24	9	40	9	55	10	11	10	27
40	7	44	7	58	8	12	8	26	8	40	8	55	9	10	9	25	9	40	9	55	10	11
50	7	33	7	46	8	0	8	14	8	28	8	42	8	57	9	11	9	26	9	41	9	56
6 0	7	23	7	36	7	50	8	3	8	16	8	30	8	44	8	58	9	13	9	27	9	42
10	7	13	7	26	7	39	7	52	8	5	8	18	8	32	8	46	9	0	9	14	9	28
20	7	3	7	15	7	28	7	41	7	54	8	7	8	20	8	34	8	48	9	2	9	16
30	6	54	7	6	7	19	7	31	7	43	7	56	8	9	8	23	8	36	8	49	9	3
40	6	44	6	56	7	8	7	20	7	32	7	45	7	58	8	11	8	24	8	37	8	50
50	6	36	6	47	6	59	7	11	7	23	7	35	7	47	8	0	8	13	8	26	8	39
7 0	6	27	6	38	6	50	7	1	7	13	7	25	7	37	7	50	8	2	8	14	8	27
10	6	19	6	30	6	42	6	53	7	4	7	16	7	28	7	40	7	52	8	4	8	17
20	6	12	6	23	6	34	6	45	6	56	7	7	7	19	7	31	7	43	7	55	8	7
30	6	5	6	15	6	26	6	37	6	48	6	59	7	10	7	22	7	34	7	46	7	58
40	5	57	6	7	6	18	6	28	6	39	6	50	7	1	7	13	7	24	7	36	7	48
50	5	50	6	0	6	10	6	21	6	31	6	42	6	53	7	4	7	15	7	26	7	38
8 0	5	44	5	54	6	4	6	14	6	24	6	35	6	46	6	56	7	7	7	18	7	30
10	5	37	5	47	5	57	6	7	6	17	6	27	6	37	6	47	6	58	7	9	7	21
20	5	31	5	40	5	50	6	0	6	10	6	20	6	30	6	40	6	51	7	2	7	13
30	5	25	5	34	5	44	5	53	6	3	6	13	6	23	6	33	6	44	6	54	7	5
40	5	20	5	29	5	38	5	48	5	57	6	7	6	17	6	27	6	37	6	47	6	58
50	5	14	5	23	5	32	5	41	5	50	6	0	6	10	6	20	6	30	6	40	6	50
9 0	5	9	5	18	5	27	5	36	5	45	5	54	6	4	6	13	6	23	6	33	6	43
10	5	4	5	12	5	21	5	30	5	39	5	48	5	57	6	7	6	16	6	26	6	36
20	4	58	5	6	5	15	5	24	5	33	5	42	5	51	6	0	6	10	6	19	6	29
30	4	53	5	1	5	10	5	19	5	27	5	36	5	45	5	54	6	3	6	12	6	22
40	4	49	4	57	5	6	5	14	5	22	5	31	5	40	5	49	5	58	6	7	6	16
50	4	44	4	52	5	0	5	8	5	16	5	25	5	34	5	43	5	52	6	1	6	10
10 0	4	39	4	47	4	55	5	3	5	11	5	20	5	29	5	37	5	46	5	55	6	4

Apparent Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																					
	20		21		22		23		24		25		26		27		28		29		30	
° ′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
10 0	4	39	4	47	4	55	5	3	5	11	5	20	5	29	5	37	5	46	5	55	6	4
10	4	35	4	43	4	51	4	59	5	7	5	15	5	24	5	32	5	41	5	49	5	58
20	4	31	4	38	4	46	4	54	5	2	5	10	5	18	5	27	5	35	5	43	5	52
30	4	27	4	34	4	42	4	50	4	58	5	6	5	14	5	22	5	30	5	38	5	47
40	4	22	4	29	4	37	4	45	4	53	5	1	5	9	5	17	5	25	5	33	5	42
50	4	18	4	25	4	33	4	40	4	48	4	56	5	4	5	12	5	20	5	28	5	36
11 0	4	14	4	21	4	29	4	36	4	44	4	52	5	0	5	7	5	15	5	23	5	31
10	4	11	4	18	4	26	4	33	4	40	4	48	4	56	5	3	5	11	5	19	5	27
20	4	8	4	15	4	22	4	29	4	36	4	44	4	52	4	59	5	7	5	15	5	23
30	4	4	4	11	4	18	4	25	4	32	4	40	4	48	4	55	5	3	5	10	5	18
40	4	1	4	8	4	15	4	22	4	29	4	36	4	44	4	51	4	59	5	6	5	14
50	3	58	4	4	4	11	4	18	4	25	4	32	4	39	4	47	4	54	5	1	5	9
12 0	3	55	4	1	4	8	4	14	4	21	4	28	4	35	4	42	4	49	4	56	5	4
10	3	52	3	58	4	5	4	11	4	18	4	25	4	32	4	39	4	46	4	53	5	0
20	3	48	3	54	4	1	4	7	4	14	4	21	4	28	4	35	4	42	4	49	4	56
30	3	45	3	51	3	58	4	4	4	11	4	18	4	24	4	31	4	38	4	45	4	52
40	3	42	3	48	3	55	4	1	4	7	4	14	4	20	4	27	4	34	4	41	4	48
50	3	40	3	46	3	52	3	58	4	4	4	11	4	18	4	24	4	30	4	37	4	44
13 0	3	37	3	43	3	49	3	55	4	1	4	8	4	15	4	21	4	27	4	34	4	41
10	3	34	3	40	3	46	3	52	3	58	4	5	4	12	4	18	4	24	4	31	4	38
20	3	32	3	38	3	44	3	50	3	56	4	2	4	8	4	15	4	21	4	27	4	34
30	3	29	3	35	3	41	3	47	3	53	3	59	4	5	4	12	4	18	4	24	4	31
40	3	27	3	32	3	38	3	44	3	50	3	56	4	2	4	8	4	14	4	20	4	27
50	3	24	3	29	3	35	3	41	3	47	3	53	3	59	4	5	4	11	4	17	4	24
14 0	3	21	3	26	3	32	3	38	3	44	3	50	3	56	4	2	4	8	4	14	4	21
10	3	19	3	24	3	30	3	35	3	41	3	47	3	53	3	59	4	5	4	11	4	18
20	3	17	3	22	3	28	3	33	3	39	3	45	3	51	3	57	4	3	4	9	4	15
30	3	15	3	20	3	26	3	31	3	36	3	42	3	48	3	54	4	0	4	6	4	12
40	3	13	3	18	3	24	3	29	3	34	3	40	3	46	3	51	3	57	4	3	4	9
50	3	10	3	15	3	21	3	26	3	31	3	37	3	43	3	48	3	54	4	0	4	6
15 0	3	8	3	13	3	19	3	24	3	29	3	35	3	41	3	46	3	52	3	57	4	3
10	3	6	3	11	3	16	3	21	3	26	3	32	3	38	3	43	3	49	3	54	4	0
20	3	4	3	9	3	14	3	19	3	24	3	30	3	36	3	41	3	47	3	52	3	58
30	3	2	3	7	3	12	3	17	3	22	3	28	3	33	3	39	3	44	3	49	3	55
40	3	0	3	5	3	10	3	15	3	20	3	25	3	30	3	36	3	41	3	46	3	52
50	2	58	3	3	3	8	3	13	3	18	3	23	3	28	3	34	3	39	3	44	3	50
16 0	2	56	3	1	3	6	3	11	3	16	3	21	3	26	3	32	3	37	3	42	3	48
10	2	54	2	59	3	4	3	9	3	14	3	19	3	24	3	30	3	35	3	40	3	46
20	2	52	2	57	3	2	3	7	3	12	3	17	3	22	3	27	3	32	3	37	3	43
30	2	51	2	55	3	0	3	5	3	10	3	15	3	20	3	25	3	30	3	35	3	41
40	2	49	2	53	2	58	3	3	3	8	3	13	3	18	3	23	3	28	3	33	3	39
50	2	47	2	51	2	56	3	1	3	6	3	11	3	16	3	21	3	26	3	31	3	36
17 0	2	45	2	49	2	54	2	59	3	4	3	9	3	14	3	19	3	24	3	29	3	34
10	2	44	2	48	2	53	2	57	3	2	3	7	3	12	3	17	3	22	3	27	3	32
20	2	42	2	46	2	51	2	55	3	0	3	5	3	10	3	15	3	20	3	25	3	30
30	2	40	2	44	2	49	2	53	2	58	3	3	3	8	3	12	3	17	3	22	3	27
40	2	38	2	42	2	47	2	51	2	56	3	1	3	6	3	10	3	15	3	20	3	25
50	2	37	2	41	2	46	2	50	2	55	3	0	3	5	3	9	3	14	3	19	3	24
18 0	2	36	2	40	2	45	2	49	2	53	2	58	3	3	3	7	3	12	3	17	3	22
10	2	34	2	38	2	43	2	47	2	51	2	56	3	1	3	5	3	10	3	15	3	20
20	2	33	2	37	2	42	2	46	2	50	2	55	3	0	3	4	3	9	3	13	3	18
30	2	31	2	35	2	40	2	44	2	48	2	53	2	58	3	2	3	7	3	11	3	16
40	2	30	2	34	2	38	2	42	2	46	2	51	2	56	3	0	3	5	3	9	3	14
50	2	29	2	33	2	37	2	41	2	45	2	50	2	54	2	59	3	3	3	7	3	12
19 0	2	27	2	31	2	35	2	39	2	43	2	48	2	52	2	57	3	1	3	5	3	10
10	2	26	2	30	2	34	2	38	2	42	2	47	2	51	2	56	3	0	3	4	3	9
20	2	25	2	29	2	33	2	37	2	41	2	45	2	49	2	54	2	58	3	2	3	7
30	2	24	2	28	2	32	2	36	2	40	2	44	2	48	2	53	2	57	3	1	3	6
40	2	22	2	26	2	30	2	34	2	38	2	42	2	46	2	51	2	55	2	59	3	4
50	2	21	2	25	2	29	2	33	2	37	2	41	2	45	2	49	2	53	2	57	3	2
20 0	2	19	2	23	2	27	2	31	2	35	2	39	2	43	2	47	2	51	2	55	3	0

TABLE VI.—Refraction in Altitude. [*subtractive.*]

Apparent Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																					
	20		21		22		23		24		25		26		27		28		29		30	
° ′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
20 0	2	19	2	23	2	27	2	31	2	35	2	39	2	43	2	47	2	51	2	55	3	0
10	2	18	2	22	2	26	2	30	2	34	2	38	2	42	2	46	2	50	2	54	2	59
20	2	17	2	20	2	24	2	28	2	32	2	36	2	40	2	44	2	48	2	52	2	57
30	2	16	2	19	2	23	2	27	2	31	2	35	2	39	2	43	2	47	2	51	2	56
40	2	15	2	18	2	22	2	26	2	30	2	34	2	38	2	42	2	46	2	50	2	54
50	2	13	2	16	2	20	2	24	2	28	2	32	2	36	2	40	2	44	2	48	2	52
21 0	2	12	2	15	2	19	2	23	2	27	2	31	2	35	2	39	2	43	2	47	2	51
10	2	11	2	14	2	18	2	22	2	26	2	30	2	34	2	38	2	42	2	46	2	50
20	2	10	2	13	2	17	2	21	2	25	2	29	2	33	2	37	2	41	2	45	2	49
30	2	9	2	12	2	16	2	19	2	23	2	27	2	31	2	35	2	39	2	43	2	47
40	2	8	2	11	2	15	2	18	2	22	2	26	2	30	2	33	2	37	2	41	2	45
50	2	7	2	10	2	14	2	17	2	21	2	25	2	29	2	32	2	36	2	40	2	44
22 0	2	6	2	9	2	13	2	16	2	20	2	24	2	28	2	31	2	35	2	39	2	43
10	2	4	2	7	2	11	2	14	2	18	2	22	2	26	2	29	2	33	2	37	2	41
20	2	3	2	6	2	10	2	13	2	17	2	21	2	25	2	28	2	32	2	36	2	40
30	2	3	2	6	2	10	2	13	2	16	2	20	2	23	2	27	2	31	2	35	2	39
40	2	2	2	5	2	9	2	12	2	15	2	19	2	22	2	26	2	29	2	33	2	37
50	2	1	2	4	2	8	2	11	2	14	2	18	2	21	2	25	2	28	2	32	2	36
23 0	2	0	2	3	2	7	2	10	2	13	2	17	2	20	2	24	2	27	2	31	2	35
10	1	59	2	2	2	6	2	9	2	12	2	16	2	19	2	23	2	26	2	30	2	34
20	1	58	2	1	2	5	2	8	2	11	2	15	2	18	2	22	2	25	2	29	2	33
30	1	57	2	0	2	4	2	7	2	10	2	14	2	17	2	21	2	24	2	28	2	32
40	1	56	1	59	2	3	2	6	2	9	2	13	2	16	2	20	2	23	2	27	2	31
50	1	56	1	59	2	2	2	5	2	8	2	12	2	15	2	19	2	22	2	25	2	29
24 0	1	55	1	58	2	1	2	4	2	7	2	11	2	14	2	18	2	21	2	24	2	28
10	1	54	1	57	2	0	2	3	2	6	2	10	2	13	2	17	2	20	2	23	2	27
20	1	53	1	56	1	59	2	2	2	5	2	9	2	12	2	16	2	19	2	22	2	26
30	1	52	1	55	1	58	2	1	2	4	2	8	2	11	2	15	2	18	2	21	2	25
40	1	51	1	54	1	57	2	0	2	3	2	7	2	10	2	14	2	17	2	20	2	24
50	1	50	1	53	1	56	1	59	2	2	2	6	2	9	2	13	2	16	2	19	2	23
25 0	1	49	1	52	1	55	1	58	2	1	2	5	2	8	2	12	2	15	2	18	2	22
10	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	13	2	16	2	20
20	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	12	2	15	2	19
30	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11	2	14	2	18
40	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	13	2	17
50	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	12	2	16
26 0	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11	2	15
10	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	14
20	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	13
30	1	42	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	12
40	1	42	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11
50	1	41	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10
27 0	1	40	1	42	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9
10	1	39	1	41	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8
20	1	39	1	41	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8
30	1	38	1	40	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7
40	1	37	1	39	1	42	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6
50	1	36	1	38	1	41	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5
28 0	1	35	1	37	1	40	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4
10	1	35	1	37	1	40	1	43	1	46	1	49	1	52	1	54	1	57	2	0	2	3
20	1	35	1	37	1	40	1	42	1	45	1	48	1	51	1	53	1	56	1	59	2	2
30	1	34	1	36	1	39	1	41	1	44	1	47	1	50	1	52	1	55	1	58	2	1
40	1	33	1	35	1	38	1	40	1	43	1	46	1	49	1	51	1	54	1	57	2	0
50	1	33	1	35	1	38	1	40	1	43	1	46	1	49	1	51	1	54	1	57	2	0
29 0	1	32	1	34	1	37	1	39	1	42	1	45	1	48	1	50	1	53	1	56	1	59
10	1	31	1	33	1	36	1	38	1	41	1	44	1	47	1	50	1	53	1	56	1	59
20	1	31	1	33	1	36	1	38	1	41	1	44	1	47	1	49	1	52	1	55	1	58
30	1	30	1	32	1	35	1	37	1	40	1	43	1	46	1	49	1	52	1	55	1	58
40	1	29	1	31	1	34	1	36	1	39	1	42	1	45	1	48	1	51	1	54	1	57
50	1	29	1	31	1	33	1	35	1	38	1	42	1	45	1	47	1	50	1	53	1	56
30 0	1	28	1	30	1	32	1	34	1	37	1	41	1	44	1	46	1	49	1	52	1	55

Apparent Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																					
	20		21		22		23		24		25		26		27		28		29		30	
°	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
30	1	28	1	30	1	32	1	34	1	37	1	41	1	44	1	46	1	49	1	52	1	55
31	1	25	1	27	1	29	1	31	1	34	1	37	1	40	1	42	1	45	1	48	1	50
32	1	22	1	24	1	26	1	28	1	30	1	33	1	36	1	38	1	40	1	43	1	45
33	1	19	1	21	1	23	1	25	1	27	1	30	1	32	1	34	1	36	1	39	1	41
34	1	16	1	18	1	20	1	22	1	24	1	26	1	28	1	30	1	32	1	35	1	37
35	1	13	1	15	1	17	1	19	1	21	1	23	1	25	1	27	1	29	1	31	1	34
36	1	10	1	12	1	14	1	16	1	18	1	20	1	22	1	24	1	26	1	28	1	31
37	1	7	1	9	1	11	1	13	1	15	1	17	1	19	1	21	1	23	1	25	1	27
38	1	5	1	7	1	9	1	11	1	13	1	15	1	17	1	18	1	20	1	22	1	24
39	1	3	1	5	1	6	1	8	1	10	1	12	1	14	1	15	1	17	1	19	1	21
40	1	1	1	3	1	4	1	6	1	8	1	10	1	12	1	13	1	15	1	17	1	19
41	0	59	1	1	1	2	1	4	1	5	1	7	1	9	1	10	1	12	1	14	1	16
42		57	0	59	1	0	1	2	1	3	1	5	1	7	1	8	1	10	1	12	1	14
43		55		57	0	58	1	0	1	1	1	3	1	5	1	6	1	7	1	9	1	11
44		53		54		55	0	57	0	58	1	0	1	2	1	3	1	4	1	6	1	8
45		51		52		53		55		56	0	58	1	0	1	1	1	2	1	4	1	6
46		49		50		51		53		54		56	0	57	0	58	0	59	1	1	1	3
47		47		48		49		51		52		54		55		56		57	0	59	1	1
48		46		47		48		50		51		53		54		55		56		58	1	0
49		45		46		47		48		49		51		52		53		54		56	0	58
50		43		44		45		46		47		49		50		51		52		53		55
51		41		42		43		44		45		47		48		49		50		51		53
52		40		41		42		43		44		46		47		48		49		50		52
53		39		40		41		42		43		44		45		46		47		48		50
54		37		38		39		40		41		42		43		44		45		46		47
55		36		37		38		39		40		41		42		43		44		45		46
56		34		35		36		37		38		39		40		41		42		43		44
57		33		34		35		36		37		38		39		40		41		42		43
58		32		32		33		34		35		36		37		38		39		40		41
59		31		31		32		33		34		35		36		37		38		39		40
60		30		30		31		32		33		34		34		35		36		37		38
61		28		28		29		30		31		32		32		33		34		35		36
62		27		27		28		29		30		31		31		32		33		34		35
63		26		26		27		28		29		30		30		31		32		33		34
64		25		25		26		26		27		28		29		29		30		31		32
65		24		24		25		25		26		27		28		28		29		29		30
66		23		23		24		24		25		26		27		27		28		28		29
67		22		22		23		23		24		25		26		26		27		27		28
68		21		21		22		22		23		24		25		25		26		26		27
69		20		20		21		21		21		22		23		23		24		24		25
70		19		19		20		20		20		21		22		22		23		23		24
71		18		18		19		19		19		20		21		21		22		22		23
72		17		17		18		18		18		19		19		20		20		20		21
73		16		16		17		17		17		18		18		19		19		19		20
74		15		15		16		16		16		17		17		18		18		18		19
75		14		14		15		15		15		16		16		17		17		17		18
76		13		13		14		14		14		15		15		16		16		16		17
77		12		12		12		12		12		13		13		14		14		14		15
78		11		11		11		11		11		12		12		13		13		13		13
79		10		10		10		10		10		11		11		12		12		12		12
80		9		9		9		9		9		10		10		11		11		11		11
81		8		8		8		8		8		9		9		10		10		10		10
82		7		7		7		7		7		8		8		9		9		9		9
83		6		6		6		6		6		7		7		8		8		8		8
84		5		5		5		5		5		6		6		7		7		7		7
85		4		4		4		4		4		5		5		6		6		6		6
86		4		4		4		4		4		4		4		4		4		4		4
87		3		3		3		3		3		3		3		3		3		3		3
88		2		2		2		2		2		2		2		2		2		2		2
89		1		1		1		1		1		1		1		1		1		1		1
90		0		0		0		0		0		0		0		0		0		0		0

TABLE VII.—Correction of the Moon's Apparent Altitude. [*additive.*]

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.									
	54′	55′	56′	57′	58′	59′	60′	61′	″	″	″	″	″	″	″	″	″	″
										0	1	2	3	4	5	6	7	8	9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
0 0	19 28	20 28	21 28	22 28	23 28	24 28	25 28	26 28	0	0	1	2	3	4	5	6	7	8	9
10	21 35	22 35	23 35	24 35	25 35	26 35	27 35	28 35	10	10	11	12	13	14	15	16	17	18	19
20	23 27	24 27	25 27	26 27	27 27	28 27	29 27	30 27	20	20	21	22	23	24	25	26	27	28	29
30	25 10	26 10	27 10	28 10	29 10	30 10	31 10	32 10	30	30	31	32	33	34	35	36	37	38	39
40	26 46	27 46	28 46	29 46	30 46	31 46	32 46	33 46	40	40	41	42	43	44	45	46	47	48	49
50	28 13	29 13	30 13	31 13	32 13	33 13	34 13	35 13	50	50	51	52	53	54	55	56	57	58	59
1 0	29 33	30 33	31 33	32 33	33 33	34 33	35 33	36 33	0	0	1	2	3	4	5	6	7	8	9
10	30 47	31 47	32 47	33 47	34 47	35 47	36 47	37 47	10	10	11	12	13	14	15	16	17	18	19
20	31 54	32 54	33 54	34 54	35 54	36 54	37 54	38 54	20	20	21	22	23	24	25	26	27	28	29
30	32 56	33 56	34 56	35 56	36 56	37 56	38 56	39 56	30	30	31	32	33	34	35	36	37	38	39
40	33 54	34 54	35 54	36 54	37 54	38 54	39 54	40 54	40	40	41	42	43	44	45	46	47	48	49
50	34 48	35 48	36 48	37 48	38 48	39 48	40 48	41 48	50	50	51	52	53	54	55	56	57	58	59
2 0	35 37	36 37	37 37	38 37	39 37	40 37	41 37	42 37	0	0	1	2	3	4	5	6	7	8	9
10	36 23	37 23	38 23	39 23	40 22	41 22	42 22	43 22	10	10	11	12	13	14	15	16	17	18	19
20	37 5	38 5	39 5	40 5	41 5	42 5	43 5	44 5	20	20	21	22	23	24	25	26	27	28	29
30	37 46	38 46	39 45	40 45	41 45	42 45	43 45	44 45	30	30	31	32	33	34	35	36	37	38	39
40	38 22	39 22	40 22	41 21	42 21	43 21	44 21	45 21	40	40	41	42	43	44	45	46	47	48	49
50	38 56	39 56	40 56	41 56	42 56	43 56	44 56	45 56	50	50	51	52	53	54	55	56	57	58	59
3 0	39 30	40 29	41 29	42 29	43 29	44 29	45 29	46 29	0	0	1	2	3	4	5	6	7	8	9
10	40 0	41 0	42 0	43 0	43 59	44 59	45 59	46 59	10	10	11	12	13	14	15	16	17	18	19
20	40 28	41 28	42 28	43 28	44 28	45 28	46 28	47 27	20	20	21	22	23	24	25	26	27	28	29
30	40 55	41 55	42 54	43 54	44 54	45 54	46 54	47 54	30	30	31	32	33	34	35	36	37	38	39
40	41 21	42 20	43 20	44 20	45 20	46 20	47 20	48 20	40	40	41	42	43	44	45	46	47	48	49
50	41 44	42 44	43 44	44 44	45 44	46 43	47 43	48 43	50	50	51	52	53	54	55	56	57	58	59
4 0	42 6	43 6	44 6	45 6	46 5	47 5	48 5	49 5	0	0	1	2	3	4	5	6	7	8	9
10	42 27	43 26	44 26	45 26	46 26	47 26	48 26	49 25	10	10	11	12	13	14	15	16	17	18	19
20	42 46	43 46	44 46	45 45	46 45	47 45	48 45	49 45	20	20	21	22	23	24	25	26	27	28	29
30	43 5	44 5	45 5	46 5	47 5	48 4	49 4	50 4	30	30	31	32	33	34	35	36	37	38	39
40	43 22	44 22	45 22	46 22	47 22	48 21	49 21	50 21	40	40	41	42	43	44	45	46	47	48	49
50	43 39	44 38	45 38	46 38	47 38	48 37	49 37	50 37	50	50	51	52	53	54	55	56	57	58	59
5 0	43 55	44 55	45 54	46 54	47 54	48 54	49 53	50 53	0	0	1	2	3	4	5	6	7	8	9
10	44 10	45 10	46 10	47 9	48 9	49 9	50 9	51 8	10	10	11	12	13	14	15	16	17	18	19
20	44 25	45 24	46 24	47 24	48 24	49 23	50 23	51 22	20	20	21	22	23	24	25	26	27	28	29
30	44 37	45 37	46 37	47 37	48 36	49 36	50 36	51 35	30	30	31	32	33	34	35	36	37	38	39
40	44 50	45 50	46 50	47 50	48 49	49 49	50 49	51 48	40	40	41	42	43	44	45	46	47	48	49
50	45 3	46 3	47 2	48 2	49 2	50 1	51 1	52 1	50	50	51	52	53	54	55	56	57	58	59
6 0	45 14	46 13	47 13	48 13	49 12	50 12	51 12	52 11	0	0	1	2	3	4	5	6	7	8	9
10	45 24	46 23	47 23	48 23	49 22	50 22	51 22	52 21	10	10	11	12	13	14	15	16	17	18	19
20	45 33	46 33	47 33	48 32	49 32	50 32	51 31	52 31	20	20	21	22	23	24	25	26	27	28	29
30	45 42	46 42	47 42	48 41	49 41	50 41	51 40	52 40	30	30	31	32	33	34	35	36	37	38	39
40	45 52	46 52	47 51	48 51	49 50	50 50	51 50	52 49	40	40	41	42	43	44	45	46	47	48	49
50	46 1	47 1	48 0	49 0	49 59	50 59	51 59	52 58	50	50	51	52	53	54	55	56	57	58	59
7 0	46 10	47 9	48 9	49 8	50 8	51 8	52 7	53 7	0	0	1	2	3	4	5	6	7	8	9
10	46 18	47 18	48 17	49 17	50 16	51 16	52 15	53 15	10	10	11	12	13	14	15	16	17	18	19
20	46 26	47 26	48 25	49 25	50 24	51 24	52 23	53 23	20	20	21	22	23	24	25	26	27	28	29
30	46 33	47 33	48 32	49 32	50 31	51 31	52 30	53 30	30	30	31	32	33	34	35	36	37	38	39
40	46 40	47 40	48 39	49 39	50 38	51 38	52 37	53 37	40	40	41	42	43	44	45	46	47	48	49
50	46 47	47 47	48 46	49 46	50 45	51 44	52 44	53 43	50	50	51	52	53	54	55	56	57	58	59
8 0	46 54	47 53	48 53	49 52	50 51	51 51	52 50	53 50	0	0	1	2	3	4	5	6	7	8	9
10	47 0	47 59	48 59	49 58	50 57	51 57	52 56	53 56	10	10	11	12	13	14	15	16	17	18	19
20	47 6	48 5	49 4	50 4	51 3	52 3	53 2	54 1	20	20	21	22	23	24	25	26	27	28	29
30	47 11	48 11	49 10	50 9	51 9	52 8	53 7	54 7	30	30	31	32	33	34	35	36	37	38	39
40	47 16	48 15	49 14	50 14	51 13	52 12	53 11	54 11	40	40	41	42	43	44	45	46	47	48	49
50	47 22	48 21	49 20	50 20	51 19	52 18	53 17	54 17	50	50	51	52	53	54	55	56	57	58	59
9 0	47 26	48 26	49 25	50 24	51 24	52 23	53 22	54 21	0	0	1	2	3	4	5	6	7	8	9
10	47 30	48 29	49 29	50 28	51 27	52 26	53 25	54 25	10	10	11	12	13	14	15	16	17	18	19
20	47 34	48 34	49 33	50 32	51 31	52 30	53 30	54 29	20	20	21	22	23	24	25	26	27	28	29
30	47 39	48 38	49 37	50 36	51 35	52 34	53 34	54 33	30	30	31	32	33	34	35	36	37	38	39
40	47 42	48 42	49 41	50 40	51 39	52 38	53 37	54 37	40	40	41	42	43	44	45	46	47	48	49
50	47 47	48 46	49 45	50 45	51 44	52 43	53 42	54 41	50	50	51	52	53	54	55	56	57	58	59
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.										
	54′	55′	56′	57′	58′	59′	60′	61′	″	″ 0	″ 1	″ 2	″ 3	″ 4	″ 5	″ 6	″ 7	″ 8	″ 9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
10 0	47 51	48 50	49 49	50 48	51 47	52 46	53 45	54 44	0	0	1	2	3	4	5	6	7	8	9
10	47 54	48 53	49 52	50 51	51 50	52 49	53 48	54 48	10	10	11	12	13	14	15	16	17	18	19
20	47 57	48 56	49 55	50 54	51 53	52 52	53 51	54 51	20	20	21	22	23	24	25	26	27	28	29
30	47 59	48 58	49 57	50 56	51 55	52 54	53 53	54 53	30	29	30	31	32	33	34	35	36	37	38
40	48 3	49 2	50 1	51 0	51 59	52 58	53 57	54 56	40	39	40	41	42	43	44	45	46	47	48
50	48 6	49 5	50 4	51 3	52 2	53 1	53 59	54 58	50	49	50	51	52	53	54	55	56	57	58
11 0	48 8	49 7	50 6	51 5	52 4	53 3	54 2	55 1	0	0	1	2	3	4	5	6	7	8	9
10	48 11	49 10	50 9	51 7	52 6	53 5	54 4	55 3	10	10	11	12	13	14	15	16	17	18	19
20	48 13	49 12	50 11	51 10	52 8	53 7	54 6	55 5	20	20	21	22	23	24	24	25	26	27	28
30	48 15	49 14	50 13	51 12	52 10	53 9	54 8	55 7	30	29	30	31	32	33	34	35	36	37	38
40	48 17	49 16	50 15	51 14	52 12	53 11	54 10	55 9	40	39	40	41	42	43	44	45	46	47	48
50	48 19	49 18	50 17	51 15	52 14	53 13	54 11	55 10	50	49	50	51	52	53	54	55	56	57	58
12 0	48 21	49 20	50 18	51 17	52 16	53 14	54 13	55 12	0	0	1	2	3	4	5	6	7	8	9
10	48 22	49 21	50 20	51 18	52 17	53 16	54 14	55 13	10	10	11	12	13	14	15	16	17	18	19
20	48 24	49 23	50 21	51 20	52 18	53 17	54 16	55 14	20	20	21	21	22	23	24	25	26	27	28
30	48 25	49 24	50 23	51 21	52 20	53 18	54 17	55 15	30	29	30	31	32	33	34	35	36	37	38
40	48 27	49 25	50 24	51 22	52 21	53 19	54 18	55 16	40	39	40	41	42	43	44	45	46	47	48
50	48 28	49 26	50 25	51 23	52 22	53 20	54 19	55 17	50	49	50	51	52	53	54	55	56	57	58
13 0	48 29	49 27	50 26	51 24	52 23	53 21	54 20	55 18	0	0	1	2	3	4	5	6	7	8	9
10	48 30	49 28	50 27	51 25	52 23	53 22	54 20	55 19	10	10	11	12	13	14	15	16	17	18	18
20	48 31	49 29	50 27	51 26	52 24	53 23	54 21	55 19	20	19	20	21	22	23	24	25	26	27	28
30	48 31	49 30	50 28	51 26	52 25	53 23	54 21	55 20	30	29	30	31	32	33	34	35	36	37	38
40	48 32	49 30	50 29	51 27	52 25	53 24	54 22	55 20	40	39	40	41	42	43	44	45	46	47	48
50	48 33	49 31	50 29	51 27	52 26	53 24	54 22	55 20	50	49	50	51	52	53	53	54	55	56	57
14 0	48 33	49 31	50 30	51 28	52 26	53 24	54 22	55 21	0	0	1	2	3	4	5	6	7	8	9
10	48 34	49 32	50 31	51 29	52 27	53 25	54 23	55 22	10	10	11	12	13	14	15	15	16	17	18
20	48 34	49 32	50 30	51 28	52 26	53 25	54 23	55 21	20	19	20	21	22	23	24	25	26	27	28
30	48 35	49 33	50 31	51 29	52 27	53 26	54 24	55 22	30	29	30	31	32	33	34	35	36	37	38
40	48 35	49 33	50 31	51 29	52 27	53 26	54 24	55 22	40	39	40	41	42	43	44	45	46	46	47
50	48 35	49 33	50 31	51 29	52 27	53 25	54 23	55 21	50	48	49	50	51	52	53	54	55	56	57
15 0	48 35	49 33	50 31	51 29	52 27	53 25	54 23	55 21	0	0	1	2	3	4	5	6	7	8	9
10	48 35	49 33	50 31	51 29	52 27	53 25	54 23	55 20	10	10	11	12	13	14	14	15	16	17	18
20	48 35	49 33	50 31	51 29	52 27	53 24	54 22	55 20	20	19	20	21	22	23	24	25	26	27	28
30	48 35	49 33	50 30	51 28	52 26	53 24	54 22	55 20	30	29	30	31	32	33	34	35	36	37	38
40	48 34	49 32	50 30	51 28	52 26	53 23	54 21	55 19	40	39	39	40	41	42	43	44	45	46	47
50	48 34	49 32	50 30	51 27	52 25	53 23	54 20	55 18	50	48	49	50	51	52	53	54	55	56	57
16 0	48 34	49 31	50 29	51 27	52 24	53 21	54 20	55 17	0	0	1	2	3	4	5	6	7	8	9
10	48 33	49 31	50 28	51 26	52 23	53 20	54 19	55 17	10	10	11	12	13	14	15	15	16	17	18
20	48 32	49 29	50 27	51 24	52 22	53 19	54 17	55 15	20	19	20	21	22	23	24	25	26	27	28
30	48 31	49 28	50 26	51 24	52 21	53 19	54 16	55 14	30	29	30	31	32	33	34	35	36	37	38
40	48 30	49 28	50 25	51 23	52 20	53 18	54 15	55 13	40	38	39	40	41	42	43	44	45	46	47
50	48 29	49 27	50 24	51 22	52 19	53 17	54 14	55 11	50	48	49	50	51	52	53	54	55	56	57
17 0	48 29	49 26	50 23	51 21	52 18	53 16	54 13	55 10	0	0	1	2	3	4	5	6	7	8	9
10	48 29	49 26	50 23	51 21	52 18	53 15	54 13	55 10	10	10	11	11	12	13	14	15	16	17	18
20	48 28	49 25	50 22	51 20	52 17	53 14	54 11	55 9	20	19	20	21	22	23	24	25	26	27	28
30	48 27	49 24	50 21	51 18	52 16	53 13	54 10	55 7	30	29	30	30	31	32	33	34	35	36	37
40	48 26	49 23	50 20	51 17	52 14	53 12	54 9	55 6	40	38	39	40	41	42	43	44	45	46	47
50	48 25	49 22	50 19	51 16	52 13	53 10	54 8	55 4	50	48	49	50	51	51	52	53	54	55	56
18 0	48 23	49 20	50 18	51 15	52 12	53 9	54 6	55 3	0	0	1	2	3	4	5	6	7	8	9
10	48 22	49 19	50 16	51 13	52 10	53 7	54 4	55 1	10	9	10	11	12	13	14	15	16	17	18
20	48 21	49 18	50 15	51 12	52 9	53 6	54 3	55 0	20	19	20	21	22	23	24	25	26	27	27
30	48 20	49 16	50 13	51 10	52 7	53 4	54 1	54 58	30	28	29	30	31	32	33	34	35	36	37
40	48 18	49 15	50 12	51 9	52 5	53 2	53 59	54 56	40	38	39	40	41	42	43	44	45	46	46
50	48 17	49 13	50 10	51 7	52 4	53 1	53 57	54 54	50	47	48	49	50	51	52	53	54	55	56
19 0	48 15	49 12	50 9	51 5	52 2	52 59	53 56	54 52	0	0	1	2	3	4	5	6	7	8	8
10	48 14	49 10	50 7	51 4	52 0	52 57	53 54	54 50	10	9	10	11	12	13	14	15	16	17	18
20	48 12	49 9	50 5	51 2	51 58	52 55	53 52	54 48	20	19	20	21	22	23	24	24	25	26	27
30	48 10	49 7	50 4	51 0	51 57	52 53	53 50	54 46	30	28	29	30	31	32	33	34	35	36	37
40	48 9	49 5	50 2	50 58	51 55	52 51	53 48	54 44	40	38	39	40	41	41	42	43	44	45	46
50	48 7	49 3	50 0	50 56	51 53	52 49	53 45	54 42	50	47	48	49	50	51	52	53	54	55	56
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

TABLE VII.—Correction of the Moon's Apparent Altitude. [*additive.*]

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.										
	54′	55′	56′	57′	58′	59′	60′	61′	″	″	″	″	″	″	″	″	″	″	″
									″	0	1	2	3	4	5	6	7	8	9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
20 0	48 5	49 1	49 58	50 54	51 51	52 47	53 43	54 40	0	0	1	2	3	4	5	6	7	8	8
10	48 3	48 59	49 56	50 52	51 48	52 45	53 41	54 37	10	9	10	11	12	13	14	15	16	17	18
20	48 1	48 58	49 54	50 50	51 46	52 43	53 39	54 35	20	19	20	21	22	22	23	24	25	26	27
30	47 59	48 56	49 52	50 48	51 44	52 40	53 37	54 33	30	28	29	30	31	32	33	34	35	36	37
40	47 57	48 53	49 50	50 46	51 42	52 38	53 34	54 30	40	37	38	39	40	41	42	43	44	45	46
50	47 55	48 51	49 47	50 44	51 40	52 36	53 32	54 28	50	47	48	49	50	51	51	52	53	54	55
21 0	47 53	48 49	49 45	50 41	51 37	52 33	53 29	54 25	0	0	1	2	3	4	5	6	7	8	8
10	47 51	48 47	49 43	50 39	51 35	52 31	53 27	54 23	10	9	10	11	12	13	14	15	16	17	18
20	47 49	48 45	49 41	50 37	51 32	52 28	53 24	54 20	20	19	20	20	21	22	23	24	25	26	27
30	47 47	48 42	49 38	50 34	51 30	52 26	53 22	54 17	30	28	29	30	31	32	33	33	34	35	36
40	47 44	48 40	49 36	50 32	51 27	52 23	53 19	54 15	40	37	38	39	40	41	42	43	44	45	46
50	47 42	48 38	49 33	50 29	51 25	52 21	53 16	54 12	50	47	47	48	49	50	51	52	53	54	55
22 0	47 40	48 35	49 31	50 27	51 22	52 18	53 14	54 9	0	0	1	2	3	4	5	6	6	7	8
10	47 37	48 33	49 28	50 24	51 20	52 15	53 11	54 6	10	9	10	11	12	13	14	15	16	17	18
20	47 35	48 30	49 26	50 21	51 17	52 12	53 8	54 3	20	18	19	20	21	22	23	24	25	26	27
30	47 33	48 29	49 24	50 20	51 15	52 11	53 6	54 1	30	28	29	30	30	31	32	33	34	35	36
40	47 31	48 26	49 22	50 17	51 12	52 8	53 3	53 58	40	37	38	39	40	41	42	43	43	44	45
50	47 28	48 24	49 19	50 14	51 10	52 5	53 0	53 55	50	46	47	48	49	50	51	52	53	54	55
23 0	47 26	48 21	49 16	50 11	51 7	52 2	52 57	53 52	0	0	1	2	3	4	5	6	6	7	8
10	47 23	48 18	49 14	50 9	51 4	51 59	52 54	53 49	10	9	10	11	12	13	14	15	16	17	17
20	47 20	48 16	49 11	50 6	51 1	51 56	52 51	53 46	20	18	19	20	21	22	23	24	25	26	27
30	47 18	48 13	49 8	50 3	50 58	51 53	52 48	53 43	30	28	28	29	30	31	32	33	34	35	36
40	47 15	48 10	49 5	50 0	50 55	51 50	52 45	53 40	40	37	38	39	39	40	41	42	43	44	45
50	47 12	48 7	49 2	49 57	50 52	51 47	52 42	53 36	50	46	47	48	49	50	50	51	52	53	54
24 0	47 9	48 4	48 59	49 54	50 49	51 43	52 38	53 33	0	0	1	2	3	4	5	5	6	7	8
10	47 6	48 1	48 56	49 51	50 45	51 40	52 35	53 30	10	9	10	11	12	13	14	14	15	16	17
20	47 4	47 58	48 53	49 48	50 42	51 37	52 32	53 25	20	18	19	20	21	22	23	24	25	25	26
30	47 1	47 55	48 50	49 45	50 39	51 34	52 28	53 23	30	27	28	29	30	31	32	33	34	35	35
40	46 58	47 50	48 47	49 41	50 36	51 30	52 25	53 19	40	36	37	38	39	40	41	42	43	44	45
50	46 54	47 48	48 44	49 38	50 33	51 27	52 21	53 16	50	46	46	47	48	49	50	51	52	53	54
25 0	46 52	47 46	48 40	49 35	50 29	51 24	52 18	53 12	0	0	1	2	3	4	5	5	6	7	8
10	46 49	47 43	48 37	49 32	50 26	51 20	52 14	53 9	10	9	10	11	12	13	14	14	15	16	17
20	46 45	47 40	48 34	49 28	50 22	51 17	52 11	53 5	20	18	19	20	21	22	23	23	24	25	26
30	46 42	47 37	48 31	49 25	50 19	51 13	52 7	53 1	30	27	28	29	30	31	32	32	33	34	35
40	46 39	47 33	48 27	49 21	50 15	51 10	52 4	52 58	40	36	37	38	39	40	41	41	42	43	44
50	46 36	47 30	48 24	49 18	50 12	51 6	52 0	52 54	50	45	46	47	48	49	50	51	51	52	53
26 0	46 33	47 27	48 21	49 14	50 8	51 2	51 56	52 50	0	0	1	2	3	4	4	5	6	7	8
10	46 29	47 23	48 17	49 11	50 5	50 59	51 52	52 46	10	9	10	11	12	13	13	14	15	16	17
20	46 26	47 20	48 14	49 7	50 1	50 55	51 49	52 42	20	18	19	20	21	21	22	23	24	25	26
30	46 23	47 16	48 10	49 4	49 57	50 51	51 45	52 39	30	27	28	29	30	30	31	32	33	34	35
40	46 19	47 13	48 6	49 0	49 54	50 47	51 41	52 35	40	36	37	38	38	39	40	41	42	43	44
50	46 16	47 9	48 3	48 56	49 50	50 44	51 37	52 31	50	45	46	47	47	48	49	50	51	52	53
27 0	46 12	47 6	47 59	48 53	49 46	50 40	51 33	52 27	0	0	1	2	3	4	4	5	6	7	8
10	46 8	47 2	47 56	48 49	49 42	50 36	51 29	52 23	10	9	10	11	12	12	13	14	15	16	17
20	46 5	46 59	47 52	48 45	49 39	50 32	51 25	52 18	20	18	19	20	20	21	22	23	24	25	26
30	46 2	46 55	47 48	48 41	49 25	50 28	51 21	52 14	30	27	27	28	29	30	31	32	33	34	35
40	45 58	46 51	47 44	48 38	49 31	50 24	51 17	52 10	40	35	36	37	38	39	40	41	42	43	43
50	45 55	46 48	47 41	48 34	49 27	50 20	51 13	52 6	50	44	45	46	47	48	49	50	51	51	52
28 0	45 51	46 44	47 37	48 30	49 23	50 16	51 9	52 2	0	0	1	2	3	4	4	5	6	7	8
10	45 47	46 40	47 33	48 26	49 19	50 12	51 5	51 57	10	9	10	11	11	12	13	14	15	16	17
20	45 43	46 36	47 29	48 22	49 15	50 8	51 0	51 53	20	18	18	19	20	21	22	23	24	25	25
30	45 40	46 32	47 25	48 18	49 11	50 3	50 56	51 49	30	26	27	28	29	30	31	32	32	33	34
40	45 36	46 29	47 21	48 14	49 6	49 59	50 52	51 44	40	35	36	37	38	39	40	40	41	42	43
50	45 32	46 25	47 17	48 10	49 2	49 55	50 47	51 40	50	44	45	46	47	47	48	49	50	51	52
29 0	45 28	46 21	47 13	48 6	48 58	49 51	50 43	51 36	0	0	1	2	3	4	4	5	6	7	8
10	45 24	46 17	47 9	48 2	48 54	49 46	50 39	51 31	10	9	10	10	11	12	13	14	15	16	17
20	45 20	46 13	47 5	47 57	48 50	49 42	50 34	51 27	20	17	18	19	20	21	22	23	23	24	25
30	45 17	46 9	47 1	47 53	48 45	49 38	50 30	51 22	30	26	27	28	29	30	30	31	32	33	34
40	45 13	46 5	46 57	47 49	48 41	49 33	50 25	51 17	40	35	36	37	37	38	39	40	41	42	43
50	45 8	46 1	46 53	47 45	48 37	49 29	50 21	51 13	50	44	44	45	46	47	48	49	50	50	51
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.										
	54′	55′	56′	57′	58′	59′	60′	61′	″	″ 0	″ 1	″ 2	″ 3	″ 4	″ 5	″ 6	″ 7	″ 8	″ 9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
30 0	45 4	45 56	46 48	47 41	48 33	49 24	50 16	51 8	0	0	1	2	3	3	4	5	6	7	8
10	45 0	45 52	46 44	47 37	48 28	49 20	50 12	51 3	10	9	9	10	11	12	13	14	15	16	16
20	44 56	45 48	46 40	47 32	48 23	49 15	50 7	50 59	20	17	18	19	20	21	22	22	23	24	25
30	44 52	45 44	46 36	47 27	48 19	49 11	50 2	50 54	30	26	27	28	28	29	30	31	32	33	34
40	44 48	45 40	46 31	47 24	48 14	49 6	49 57	50 48	40	34	35	36	37	38	39	40	41	41	42
50	44 44	45 35	46 27	47 18	48 10	49 1	49 53	50 44	50	43	44	45	46	47	47	48	49	50	51
31 0	44 40	45 31	46 22	47 14	48 5	48 57	49 48	50 40	0	0	1	2	3	3	4	5	6	7	8
10	44 36	45 28	46 19	47 10	48 1	48 53	49 44	50 36	10	9	9	10	11	12	13	14	15	15	16
20	44 32	45 23	46 15	47 6	47 57	48 48	49 40	50 31	20	17	18	19	20	20	21	22	23	24	25
30	44 28	45 19	46 10	47 1	47 52	48 44	49 35	50 26	30	26	26	27	28	29	30	31	32	32	33
40	44 23	45 14	46 6	46 57	47 47	48 39	49 30	50 21	40	34	35	36	37	38	38	39	40	41	42
50	44 19	45 10	46 1	46 52	47 42	48 34	49 25	50 16	50	43	44	44	45	46	47	48	49	49	50
32 0	44 15	45 5	45 56	46 47	47 38	48 29	49 20	50 11	0	0	1	2	3	3	4	5	6	7	8
10	44 10	45 1	45 52	46 43	47 33	48 24	49 15	50 6	10	8	9	10	11	12	13	13	14	15	16
20	44 6	44 56	45 47	46 38	47 29	48 19	49 10	50 1	20	17	18	19	19	20	21	22	23	24	24
30	44 1	44 52	45 43	46 33	47 24	48 14	49 5	49 56	30	25	26	27	28	28	29	30	31	32	33
40	43 57	44 47	45 38	46 28	47 19	48 9	49 0	49 50	40	33	34	35	36	37	38	38	39	40	41
50	43 53	44 43	45 33	46 24	47 14	48 4	48 55	49 45	50	42	43	44	45	46	47	47	48	49	50
33 0	43 48	44 38	45 28	46 19	47 9	47 59	48 50	49 40	0	0	1	2	3	3	4	5	6	7	8
10	43 43	44 33	45 24	46 14	47 4	47 54	48 44	49 35	10	8	9	10	11	12	13	13	14	15	16
20	43 38	44 29	45 19	46 9	46 59	47 49	48 39	49 29	20	17	18	18	19	20	21	22	23	23	24
30	43 34	44 24	45 14	46 4	46 54	47 44	48 34	49 24	30	25	26	27	28	28	29	30	31	32	33
40	43 29	44 19	45 9	45 59	46 49	47 39	48 29	49 19	40	33	34	35	36	37	38	38	39	40	41
50	43 24	44 14	45 4	45 54	46 44	47 34	48 24	49 13	50	42	43	43	44	45	46	47	48	48	49
34 0	43 20	44 10	44 59	45 49	46 39	47 28	48 18	49 8	0	0	1	2	2	3	4	5	6	7	7
10	43 15	44 5	44 54	45 44	46 34	47 23	48 13	49 2	10	8	9	10	11	12	12	13	14	15	16
20	43 10	44 0	44 49	45 39	46 28	47 18	48 7	48 57	20	16	17	18	19	20	21	21	22	23	24
30	43 5	43 55	44 44	45 34	46 23	47 13	48 2	48 52	30	25	26	26	27	28	29	30	30	31	32
40	43 1	43 50	44 39	45 29	46 18	47 7	47 57	48 46	40	33	34	35	35	36	37	38	39	40	40
50	42 56	43 45	44 34	45 23	46 13	47 2	47 51	48 40	50	41	42	43	44	44	45	46	47	48	49
35 0	42 51	43 40	44 29	45 18	46 7	46 57	47 46	48 35	0	0	1	2	2	3	4	5	6	7	7
10	42 46	43 35	44 24	45 13	46 2	46 51	47 40	48 29	10	8	9	10	11	11	12	13	14	15	15
20	42 41	43 30	44 19	45 8	45 57	46 46	47 35	48 24	20	16	17	18	19	20	20	21	22	23	24
30	42 36	43 25	44 14	45 3	45 51	46 40	47 29	48 18	30	24	25	26	27	28	28	29	30	31	32
40	42 31	43 20	44 8	44 57	45 46	46 35	47 23	48 12	40	33	33	34	35	36	37	37	38	39	40
50	42 26	43 15	44 3	44 52	45 41	46 29	47 18	48 6	50	41	42	42	43	44	45	46	46	47	48
36 0	42 21	43 9	43 58	44 47	45 35	46 24	47 12	48 1	0	0	1	2	2	3	4	5	6	6	7
10	42 16	43 4	43 53	44 41	45 30	46 18	47 6	47 55	10	8	9	10	10	11	12	13	14	14	15
20	42 11	42 59	43 47	44 36	45 24	46 12	47 1	47 49	20	16	17	18	18	19	20	21	22	23	23
30	42 6	42 54	43 42	44 30	45 19	46 7	46 55	47 43	30	24	25	26	27	27	28	29	30	31	31
40	42 0	42 49	43 37	44 25	45 13	46 1	46 49	47 37	40	32	33	34	35	35	36	37	38	39	39
50	41 55	42 44	43 31	44 19	45 7	45 55	46 43	47 31	50	40	41	42	43	43	44	45	46	47	47
37 0	41 50	42 38	43 26	44 14	45 2	45 50	46 38	47 26	0	0	1	2	2	3	4	5	6	6	7
10	41 45	42 33	43 20	44 8	44 56	45 44	46 32	47 20	10	8	9	10	10	11	12	13	13	14	15
20	41 40	42 27	43 15	44 3	44 50	45 38	46 26	47 14	20	16	17	17	18	19	20	21	21	22	23
30	41 34	42 22	43 10	43 57	44 45	45 32	46 20	47 8	30	24	25	25	26	27	28	29	29	30	31
40	41 29	42 16	43 4	43 51	44 39	45 26	46 14	47 1	40	32	33	33	34	35	36	36	37	38	39
50	41 24	42 11	42 58	43 46	44 33	45 21	46 8	46 55	50	40	40	41	42	43	44	44	45	46	47
38 0	41 18	42 6	42 53	43 40	44 27	45 15	46 2	46 49	0	0	1	2	2	3	4	5	5	6	7
10	41 13	42 0	42 47	43 34	44 22	45 9	45 56	46 43	10	8	9	9	10	11	12	13	13	14	15
20	41 8	41 55	42 42	43 29	44 16	45 3	45 50	46 37	20	16	16	17	18	19	20	20	21	22	23
30	41 2	41 49	42 36	43 23	44 10	44 57	45 44	46 31	30	23	24	25	26	27	27	28	29	30	31
40	40 57	41 43	42 30	43 17	44 4	44 51	45 38	46 25	40	31	32	33	34	34	35	36	37	38	38
50	40 51	41 38	42 25	43 11	43 58	44 45	45 32	46 18	50	39	40	41	41	42	43	44	45	45	46
39 0	40 46	41 32	42 19	43 6	43 52	44 39	45 25	46 12	0	0	1	2	2	3	4	5	5	6	7
10	40 40	41 27	42 13	43 0	43 46	44 33	45 19	46 6	10	8	9	9	10	11	12	12	13	14	15
20	40 35	41 21	42 7	42 54	43 40	44 27	45 13	45 59	20	15	16	17	18	19	19	20	21	22	23
30	40 29	41 15	42 2	42 48	43 34	44 20	45 7	45 53	30	23	24	25	25	26	27	28	29	29	30
40	40 23	41 10	41 56	42 42	43 28	44 14	45 1	45 47	40	31	32	32	33	34	35	36	36	37	38
50	40 18	41 4	41 50	42 36	43 22	44 8	44 54	45 40	50	39	39	40	41	42	42	43	44	45	46
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

TABLE VII.—Correction of the Moon's Apparent Altitude. [*additive.*]

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.										
	54′	55′	56′	57′	58′	59′	60′	61′	″	″	″	″	″	″	″	″	″	″	″
										0	1	2	3	4	5	6	7	8	9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
40 0	40 12	40 58	41 44	42 30	43 16	44 2	44 48	45 34	0	0	1	1	2	3	4	5	5	6	7
10	40 6	40 52	41 38	42 24	43 10	43 56	44 42	45 27	10	8	8	9	10	11	11	12	13	14	14
20	40 1	40 46	41 32	42 18	43 4	43 49	44 35	45 21	20	15	16	17	17	18	19	20	21	21	22
30	39 55	40 41	41 26	42 12	42 58	43 43	44 29	45 16	30	23	24	24	25	26	27	27	28	29	30
40	39 49	40 35	41 20	42 6	42 51	43 37	44 22	45 9	40	30	31	32	33	33	34	35	36	36	37
50	39 44	40 29	41 14	42 0	42 45	43 31	44 16	45 2	50	38	39	40	40	41	42	43	43	44	45
41 0	39 38	40 23	41 8	41 54	42 39	43 24	44 9	44 56	0	0	1	1	2	3	4	4	5	6	7
10	39 32	40 17	41 2	41 48	42 33	43 18	44 3	44 49	10	7	8	9	10	10	11	12	13	13	14
20	39 26	40 11	40 56	41 41	42 26	43 11	43 56	44 42	20	15	16	16	17	18	19	19	20	21	22
30	39 20	40 5	40 50	41 35	42 20	43 5	43 50	44 35	30	22	23	24	25	25	26	27	28	28	29
40	39 14	39 59	40 44	41 29	42 14	42 58	43 43	44 28	40	30	31	31	32	33	34	34	35	36	37
50	39 9	39 53	40 38	41 23	42 7	42 52	43 37	44 21	50	37	38	39	40	40	41	42	43	43	44
42 0	39 3	39 47	40 32	41 16	42 1	42 46	43 30	44 15	0	0	1	1	2	3	4	4	5	6	7
10	38 57	39 41	40 26	41 10	41 54	42 39	43 23	44 8	10	7	8	9	10	10	11	12	13	13	14
20	38 51	39 35	40 19	41 4	41 48	42 32	43 17	44 1	20	15	15	16	17	18	18	19	20	21	21
30	38 45	39 29	40 13	40 57	41 42	42 26	43 10	43 54	30	22	23	24	24	25	26	27	27	28	29
40	38 39	39 23	40 7	40 51	41 35	42 19	43 3	43 47	40	29	30	31	32	32	33	34	35	35	36
50	38 33	39 17	40 1	40 45	41 29	42 13	42 57	43 41	50	37	38	38	39	40	41	41	42	43	43
43 0	38 27	39 10	39 54	40 38	41 22	42 6	42 50	43 34	0	0	1	1	2	3	4	4	5	6	7
10	38 21	39 5	39 49	40 33	41 16	42 0	42 44	43 28	10	7	8	9	9	10	11	12	12	13	14
20	38 15	38 59	39 43	40 26	41 10	41 54	42 37	43 21	20	15	15	16	17	17	18	19	20	20	21
30	38 9	38 53	39 36	40 20	41 3	41 47	42 30	43 14	30	22	22	23	24	25	25	26	27	28	28
40	38 3	38 46	39 30	40 13	40 57	41 40	42 23	43 7	40	29	30	30	31	32	33	33	34	35	36
50	37 57	38 40	39 23	40 7	40 50	41 33	42 17	43 0	50	36	37	38	38	39	40	41	41	42	43
44 0	37 51	38 34	39 17	40 0	40 43	41 26	42 10	42 53	0	0	1	1	2	3	4	4	5	6	6
10	37 44	38 27	39 10	39 53	40 36	41 19	42 3	42 46	10	7	8	9	9	10	11	11	12	13	14
20	37 38	38 21	39 4	39 47	40 30	41 13	41 56	42 39	20	14	15	16	16	17	18	19	19	20	21
30	37 32	38 15	38 58	39 40	40 23	41 6	41 49	42 32	30	21	22	23	24	24	25	26	26	27	28
40	37 26	38 8	38 51	39 34	40 16	40 59	41 42	42 24	40	29	29	30	31	31	32	33	34	34	35
50	37 19	38 2	38 45	39 27	40 10	40 52	41 35	42 17	50	36	36	37	38	39	39	40	41	41	42
45 0	37 13	37 55	38 38	39 20	40 3	40 45	41 28	42 10	0	0	1	1	2	3	4	4	5	6	6
10	37 7	37 49	38 31	39 14	39 56	40 38	41 21	42 3	10	7	8	8	9	10	11	11	12	13	13
20	37 0	37 43	38 25	39 7	39 49	40 31	41 13	41 56	20	14	15	15	16	17	18	18	19	20	20
30	36 54	37 36	38 18	39 0	39 42	40 24	41 6	41 48	30	21	22	22	23	24	25	25	26	27	27
40	36 48	37 30	38 11	38 53	39 35	40 17	40 59	41 41	40	28	29	29	30	31	32	32	33	34	34
50	36 41	37 23	38 5	38 47	39 28	40 10	40 52	41 34	50	35	36	36	37	38	39	39	40	41	41
46 0	36 35	37 16	37 58	38 40	39 21	40 3	40 45	41 26	0	0	1	1	2	3	4	4	5	6	6
10	36 28	37 10	37 51	38 33	39 14	39 56	40 38	41 19	10	7	8	8	9	10	10	11	12	12	13
20	36 22	37 3	37 45	38 26	39 7	39 49	40 30	41 12	20	14	14	15	16	17	17	18	19	19	20
30	36 15	36 57	37 38	38 19	39 0	39 42	40 23	41 4	30	21	21	22	23	23	24	25	25	26	27
40	36 8	36 50	37 31	38 12	38 53	39 35	40 16	40 57	40	28	28	29	30	30	31	32	32	33	34
50	36 2	36 43	37 25	38 5	38 46	39 27	40 8	40 49	50	34	35	36	36	37	38	39	39	40	41
47 0	35 56	36 37	37 18	37 58	38 39	39 19	40 1	40 42	0	0	1	1	2	3	3	4	5	5	6
10	35 49	36 30	37 11	37 51	38 32	39 13	39 54	40 35	10	7	7	8	9	9	10	11	11	12	13
20	35 42	36 23	37 4	37 44	38 25	39 6	39 46	40 27	20	14	14	15	16	16	17	17	18	19	20
30	35 36	36 16	36 57	37 37	38 18	38 58	39 39	40 19	30	20	21	22	22	23	24	24	25	26	26
40	35 29	36 9	36 50	37 30	38 11	38 51	39 32	40 12	40	27	28	28	29	30	30	31	32	32	33
50	35 22	36 3	36 43	37 23	38 4	38 44	39 24	40 4	50	34	34	35	36	37	37	38	39	39	40
48 0	35 16	35 56	36 36	37 16	37 56	38 36	39 17	39 57	0	0	1	1	2	3	3	4	5	5	6
10	35 9	35 49	36 29	37 9	37 49	38 29	39 9	39 49	10	7	7	8	9	9	10	11	11	12	13
20	35 2	35 42	36 22	37 2	37 42	38 22	39 2	39 41	20	13	14	15	15	16	17	17	18	19	19
30	34 55	35 35	36 15	36 55	37 35	38 14	38 54	39 34	30	20	21	21	22	23	23	24	25	25	26
40	34 49	35 28	36 8	36 48	37 27	38 7	38 46	39 26	40	27	27	28	29	29	30	30	31	32	32
50	34 42	35 21	36 1	36 40	37 20	37 59	38 39	39 18	50	33	34	34	35	36	36	37	38	38	39
49 0	34 35	35 15	35 54	36 33	37 13	37 52	38 31	39 11	0	0	1	1	2	3	3	4	5	5	6
10	34 28	35 8	35 47	36 26	37 5	37 44	38 24	39 3	10	6	7	8	8	9	10	10	11	12	12
20	34 21	35 1	35 40	36 19	36 58	37 37	38 16	38 55	20	13	14	14	15	16	16	17	18	18	19
30	34 15	34 54	35 33	36 11	36 50	37 29	38 8	38 47	30	19	20	21	21	22	23	23	24	25	25
40	34 8	34 47	35 25	36 4	36 43	37 22	38 1	38 40	40	26	27	27	28	29	29	30	31	31	32
50	34 1	34 39	35 18	35 57	36 36	37 14	37 53	38 32	50	32	33	34	34	35	36	36	37	38	38
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.										
	54′	55′	56′	57′	58′	59′	60′	61′	″	″ 0	″ 1	″ 2	″ 3	″ 4	″ 5	″ 6	″ 7	″ 8	″ 9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
50 0	33 54	34 31	35 11	35 50	36 28	37 7	37 45	38 24	0	0	1	1	2	3	3	4	4	5	6
10	33 47	34 25	35 4	35 42	36 21	36 59	37 37	38 16	10	6	7	8	8	9	10	10	11	11	12
20	33 40	34 18	34 57	35 35	36 13	36 51	37 30	38 8	20	13	13	14	15	15	16	17	17	18	18
30	33 33	34 11	34 49	35 27	36 6	36 44	37 22	38 0	30	19	20	20	21	22	22	23	24	24	25
40	33 26	34 4	34 42	35 20	35 58	36 36	37 14	37 52	40	25	26	27	27	28	29	29	30	31	31
50	33 19	33 57	34 35	35 13	35 50	36 28	37 6	37 44	50	32	32	33	34	34	35	36	36	37	38
51 0	33 12	33 50	34 27	35 5	35 43	36 21	36 58	37 36	0	0	1	1	2	2	3	4	4	5	6
10	33 5	33 42	34 20	34 58	35 35	36 13	36 51	37 28	10	6	7	7	8	9	9	10	11	11	12
20	32 58	33 35	34 13	34 50	35 28	36 5	36 43	37 20	20	12	13	14	14	15	16	16	17	17	18
30	32 51	33 28	34 5	34 43	35 20	35 57	36 35	37 12	30	19	19	20	21	21	22	22	23	24	24
40	32 44	33 21	33 58	34 35	35 12	35 50	36 27	37 4	40	25	26	26	27	28	29	29	30	30	31
50	32 36	33 13	33 51	34 28	35 5	35 42	36 19	36 56	50	31	32	32	33	34	34	35	35	36	37
52 0	32 29	33 6	33 43	34 20	34 57	35 34	36 11	36 48	0	0	1	1	2	2	3	4	4	5	5
10	32 22	32 59	33 36	34 12	34 49	35 26	36 3	36 40	10	6	7	7	8	9	9	10	10	11	12
20	32 15	32 52	33 28	34 5	34 42	35 18	35 55	36 32	20	12	13	13	14	15	15	16	16	17	18
30	32 8	32 44	33 21	33 57	34 34	35 10	35 47	36 23	30	18	19	19	20	21	21	22	23	23	24
40	32 0	32 37	33 13	33 50	34 26	35 2	35 39	36 15	40	24	25	26	26	27	27	28	29	29	30
50	31 53	32 29	33 6	33 42	34 18	34 54	35 31	36 7	50	30	31	32	32	33	33	34	35	35	36
53 0	31 46	32 22	32 58	33 34	34 10	34 47	35 23	35 59	0	0	1	1	2	2	3	4	4	5	5
10	31 39	32 15	32 51	33 27	34 3	34 39	35 14	35 50	10	6	6	7	8	8	9	10	10	11	11
20	31 31	32 7	32 43	33 19	33 55	34 31	35 6	35 42	20	12	12	13	14	14	15	15	16	17	17
30	31 24	32 0	32 35	33 11	33 47	34 23	34 58	35 34	30	18	18	19	19	20	21	21	22	23	23
40	31 17	31 52	32 28	33 3	33 39	34 14	34 50	35 26	40	24	24	25	26	26	27	27	28	29	29
50	31 9	31 44	32 20	32 56	33 31	34 6	34 42	35 17	50	30	30	31	32	32	33	33	34	35	35
54 0	31 2	31 37	32 12	32 48	33 23	33 58	34 34	35 9	0	0	1	1	2	2	3	3	4	5	5
10	30 55	31 30	32 5	32 40	33 15	33 50	34 25	35 1	10	6	6	7	8	8	9	9	10	10	11
20	30 47	31 22	31 57	32 32	33 7	33 42	34 17	34 52	20	12	12	13	13	14	15	15	16	16	17
30	30 40	31 15	31 50	32 24	32 59	33 34	34 9	34 44	30	17	18	19	19	20	20	21	21	22	23
40	30 32	31 7	31 42	32 17	32 51	33 26	34 1	34 35	40	23	24	24	25	26	26	27	27	28	28
50	30 25	31 0	31 34	32 9	32 43	33 18	33 52	34 27	50	29	30	30	31	31	32	32	33	34	34
55 0	30 18	30 52	31 26	32 1	32 35	33 10	33 44	34 18	0	0	1	1	2	2	3	3	4	5	5
10	30 10	30 44	31 19	31 53	32 27	33 1	33 36	34 10	10	6	6	7	7	8	8	9	10	10	11
20	30 3	30 37	31 11	31 45	32 19	32 53	33 27	34 1	20	11	12	12	13	14	14	15	15	16	16
30	29 55	30 29	31 3	31 37	32 11	32 45	33 19	33 53	30	17	18	18	19	19	20	20	21	22	22
40	29 47	30 21	30 54	31 28	32 2	32 36	33 10	33 44	40	23	23	24	24	25	25	26	27	27	28
50	29 39	30 13	30 46	31 20	31 54	32 28	33 1	33 35	50	28	29	29	30	31	31	32	32	33	33
56 0	29 32	30 6	30 39	31 13	31 46	32 20	32 53	33 27	0	0	1	1	2	2	3	3	4	4	5
10	29 25	29 58	30 32	31 5	31 38	32 12	32 45	33 19	10	6	6	7	7	8	8	9	9	10	10
20	29 17	29 50	30 24	30 57	31 30	32 3	32 37	33 10	20	11	12	12	13	13	14	14	15	15	16
30	29 10	29 43	30 16	30 49	31 22	31 55	32 28	33 1	30	17	17	18	18	19	19	20	20	21	22
40	29 2	29 35	30 8	30 41	31 14	31 47	32 20	32 53	40	22	23	23	24	24	25	25	26	26	27
50	28 54	29 27	30 0	30 33	31 6	31 38	32 11	32 44	50	28	28	29	29	30	30	31	31	32	33
57 0	28 47	29 19	29 52	30 25	30 57	31 30	32 3	32 35	0	0	1	1	2	2	3	3	4	4	5
10	28 39	29 11	29 44	30 17	30 49	31 21	31 54	32 27	10	5	6	6	7	8	8	9	9	10	10
20	28 31	29 4	29 36	30 8	30 41	31 13	31 46	32 18	20	11	11	12	12	13	13	14	14	15	16
30	28 23	28 56	29 28	30 0	30 32	31 5	31 37	32 9	30	16	17	17	18	18	19	19	20	20	21
40	28 16	28 48	29 20	29 52	30 24	30 56	31 28	32 0	40	21	22	23	23	24	24	25	25	26	26
50	28 8	28 40	29 12	29 44	30 16	30 48	31 20	31 52	50	27	27	28	28	29	30	30	31	31	32
58 0	28 0	28 32	29 4	29 36	30 8	30 39	31 11	31 43	0	0	1	1	2	2	3	3	4	4	5
10	27 52	28 24	28 56	29 28	29 59	30 31	31 2	31 34	10	5	6	6	7	7	8	8	9	9	10
20	27 45	28 16	28 48	29 19	29 51	30 22	30 54	31 25	20	10	11	11	12	13	13	14	14	15	15
30	27 37	28 8	28 40	29 11	29 42	30 14	30 45	31 16	30	16	16	17	17	18	18	19	19	20	20
40	27 29	28 0	28 32	29 3	29 34	30 5	30 36	31 8	40	21	21	22	22	23	23	24	25	25	26
50	27 21	27 52	28 23	28 55	29 26	29 57	30 28	30 59	50	26	27	27	28	28	29	29	30	30	31
59 0	27 14	27 44	28 15	28 46	29 17	29 48	30 19	30 50	0	0	1	1	2	2	3	3	4	4	5
10	27 6	27 36	28 7	28 38	29 9	29 39	30 10	30 41	10	5	6	6	7	7	8	8	9	9	10
20	26 58	27 29	27 59	28 30	29 0	29 31	30 1	30 32	20	10	11	11	12	12	13	13	14	14	15
30	26 50	27 20	27 51	28 21	28 52	29 22	29 53	30 23	30	15	16	16	17	17	18	18	19	19	20
40	26 42	27 12	27 43	28 13	28 43	29 13	29 44	30 14	40	20	21	21	22	22	23	23	24	24	25
50	26 34	27 4	27 34	28 5	28 35	29 5	29 35	30 5	50	25	26	26	27	27	28	28	29	29	30
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

TABLE VII.—Correction of the Moon's Apparent Altitude. [*additive.*]

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.									
	54′	55′	56′	57′	58′	59′	60′	61′	″	″	″	″	″	″	″	″	″	″
									″.	0	1	2	3	4	5	6	7	8	9
o ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
60 0	26 26	26 56	27 26	27 56	28 26	28 56	29 26	29 56	0	0	0	1	1	2	2	3	3	4	4
10	26 18	26 48	27 18	27 48	28 18	28 47	29 17	29 47	10	5	5	6	6	7	7	8	8	9	9
20	26 10	26 40	27 10	27 39	28 9	28 39	29 8	29 38	20	10	10	11	11	12	12	13	13	14	14
30	26 2	26 32	27 1	27 31	28 0	28 30	29 0	29 29	30	15	15	16	16	17	17	18	18	19	19
40	25 54	26 24	26 53	27 22	27 52	28 21	28 51	29 20	40	20	20	21	21	22	22	23	23	24	24
50	25 46	26 15	26 45	27 14	27 43	28 12	28 42	29 11	50	25	25	26	26	27	27	28	28	29	29
61 0	25 38	26 7	26 36	27 5	27 35	28 4	28 33	29 2	0	0	0	1	1	2	2	3	3	4	4
10	25 30	25 59	26 28	26 57	27 26	27 55	28 24	28 53	10	5	5	6	6	7	7	8	8	9	9
20	25 22	25 51	26 20	26 48	27 17	27 46	28 15	28 44	20	10	10	10	11	11	12	12	13	13	14
30	25 14	25 43	26 11	26 40	27 9	27 37	28 6	28 34	30	14	15	15	16	16	17	17	18	18	19
40	25 6	25 34	26 3	26 31	27 0	27 28	27 57	28 25	40	19	20	20	21	21	22	22	23	23	
50	24 58	25 26	25 55	26 23	26 51	27 20	27 48	28 16	50	24	24	25	25	26	26	27	27	28	28
62 0	24 50	25 18	25 46	26 14	26 42	27 11	27 39	28 7	0	0	0	1	1	2	2	3	3	4	4
10	24 42	25 10	25 38	26 6	26 34	27 2	27 30	27 58	10	5	5	6	6	6	7	7	8	8	9
20	24 34	25 1	25 29	25 57	26 25	26 53	27 21	27 49	20	9	10	10	11	11	12	12	12	13	13
30	24 25	24 53	25 21	25 49	26 16	26 44	27 12	27 39	30	14	14	15	15	16	16	17	17	18	18
40	24 16	24 45	25 12	25 40	26 7	26 35	27 3	27 30	40	18	19	19	20	20	21	21	22	22	23
50	24 9	24 37	25 4	25 31	25 59	26 26	26 53	27 21	50	23	24	24	24	25	25	26	26	27	27
63 0	24 1	24 28	24 55	25 23	25 50	26 17	26 44	27 12	0	0	0	1	1	2	2	3	3	4	4
10	23 53	24 20	24 47	25 14	25 41	26 8	26 35	27 2	10	4	5	5	6	6	7	7	8	8	8
20	23 44	24 11	24 38	25 5	25 32	25 59	26 26	26 53	20	9	9	10	10	11	11	12	12	12	13
30	23 36	24 3	24 30	24 57	25 23	25 50	26 17	26 44	30	13	14	14	15	15	16	16	17	17	17
40	23 28	23 55	24 21	24 48	25 14	25 41	26 8	26 34	40	18	18	19	19	20	20	21	21	21	22
50	23 20	23 46	24 13	24 39	25 6	25 32	25 59	26 25	50	22	23	23	24	24	25	25	25	26	26
64 0	23 12	23 38	24 4	24 30	24 57	25 23	25 49	26 16	0	0	0	1	1	2	2	3	3	3	4
10	23 3	23 29	23 56	24 22	24 48	25 14	25 40	26 6	10	4	5	5	6	6	6	7	7	8	8
20	22 55	23 21	23 47	24 13	24 39	25 5	25 31	25 57	20	9	9	9	10	10	11	11	12	12	12
30	22 47	23 13	23 38	24 4	24 30	24 56	25 22	25 47	30	13	13	14	14	15	15	15	16	16	17
40	22 38	23 4	23 30	23 55	24 21	24 47	25 12	25 38	40	17	18	18	18	19	19	20	20	21	21
50	22 30	22 56	23 21	23 47	24 12	24 38	25 3	25 29	50	22	22	22	23	23	24	24	25	25	25
65 0	22 22	22 47	23 12	23 38	24 3	24 29	24 54	25 19	0	0	0	1	1	2	2	2	3	3	4
10	22 13	22 39	23 4	23 29	23 54	24 19	24 45	25 10	10	4	5	5	5	6	6	7	7	7	8
20	22 5	22 30	22 55	23 20	23 45	24 10	24 35	25 0	20	8	9	9	10	10	10	11	11	12	12
30	21 57	22 22	22 46	23 11	23 36	24 1	24 26	24 51	30	12	13	13	14	14	14	15	15	16	16
40	21 48	22 13	22 38	23 2	23 27	23 52	24 17	24 41	40	17	17	17	18	18	19	19	19	20	20
50	21 40	22 4	22 29	22 54	23 18	23 43	24 7	24 32	50	21	21	22	22	22	23	23	24	24	24
66 0	21 31	21 56	22 20	22 45	23 9	23 33	23 58	24 22	0	0	0	1	1	2	2	2	3	3	4
10	21 23	21 47	22 12	22 36	23 0	23 24	23 49	24 13	10	4	4	5	5	6	6	6	7	7	8
20	21 15	21 39	22 3	22 27	22 51	23 15	23 39	24 3	20	8	8	9	9	10	10	10	11	11	12
30	21 6	21 30	21 54	22 18	22 42	23 6	23 30	23 54	30	12	12	13	13	14	14	14	15	15	16
40	20 58	21 22	21 45	22 9	22 33	22 57	23 20	23 44	40	16	16	17	17	18	18	18	19	19	20
50	20 49	21 13	21 36	22 0	22 24	22 47	23 11	23 34	50	20	20	21	21	21	22	22	23	23	23
67 0	20 41	21 4	21 28	21 51	22 15	22 38	23 1	23 25	0	0	0	1	1	2	2	2	3	3	3
10	20 32	20 56	21 19	21 42	22 5	22 29	22 52	23 15	10	4	4	5	5	5	6	6	6	7	7
20	20 24	20 47	21 10	21 33	21 56	22 19	22 43	23 6	20	8	8	8	9	9	10	10	10	11	11
30	20 15	20 38	21 1	21 24	21 47	22 10	22 33	22 56	30	11	12	12	13	13	13	14	14	14	15
40	20 7	20 30	20 52	21 15	21 38	22 1	22 24	22 46	40	15	16	16	16	17	17	18	18	18	19
50	19 58	20 21	20 44	21 6	21 29	21 51	22 14	22 37	50	19	19	20	20	21	21	21	22	22	22
68 0	19 50	20 12	20 35	20 57	21 20	21 42	22 5	22 27	0	0	0	1	1	2	2	2	3	3	3
10	19 41	20 3	20 26	20 48	21 10	21 33	21 55	22 17	10	4	4	4	5	5	5	6	6	7	7
20	19 33	19 55	20 17	20 39	21 1	21 23	21 45	22 8	20	7	8	8	8	9	9	10	10	10	11
30	19 24	19 46	20 8	20 30	20 52	21 14	21 36	21 58	30	11	11	12	12	12	13	13	14	14	14
40	19 15	19 37	19 59	20 21	20 43	21 5	21 26	21 48	40	15	15	15	16	16	16	17	17	18	18
50	19 6	19 28	19 50	20 12	20 33	20 55	21 17	21 39	50	18	19	19	19	20	20	20	21	21	22
69 0	18 58	19 20	19 41	20 3	20 24	20 46	21 8	21 29	0	0	0	1	1	1	2	2	2	3	3
10	18 51	19 12	19 33	19 55	20 16	20 37	20 59	21 20	10	4	4	4	5	5	5	6	6	6	7
20	18 42	19 3	19 24	19 46	20 7	20 28	20 49	21 10	20	7	7	8	8	8	9	9	9	10	10
30	18 33	18 54	19 15	19 36	19 57	20 18	20 39	21 0	30	11	11	11	12	12	12	13	13	13	14
40	18 25	18 46	19 6	19 27	19 48	20 9	20 30	20 51	40	14	14	15	15	15	16	16	16	17	17
50	18 16	18 37	18 57	19 18	19 39	20 0	20 20	20 41	50	18	18	18	19	19	19	20	20	20	21
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

App. Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.										
	54′	55′	56′	57′	58′	59′	60′	61′	″	″ 0	″ 1	″ 2	″ 3	″ 4	″ 5	″ 6	″ 7	″ 8	″ 9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
70 0	18 7	18 28	18 49	19 9	19 30	19 50	20 11	20 31	0	0	0	1	1	1	2	2	2	3	3
10	17 59	18 19	18 39	19 0	19 20	19 41	20 1	20 21	10	3	4	4	4	5	5	5	6	6	6
20	17 50	18 10	18 30	18 51	19 11	19 31	19 51	20 11	20	7	7	7	8	8	8	9	9	9	10
30	17 41	18 1	18 21	18 41	19 1	19 22	19 42	20 2	30	10	10	11	11	11	12	12	12	13	13
40	17 33	17 53	18 12	18 32	18 52	19 12	19 32	19 52	40	13	14	14	14	15	15	15	16	16	16
50	17 24	17 44	18 3	18 23	18 43	19 2	19 22	19 42	50	17	17	17	18	18	18	19	19	19	20
71 0	17 15	17 35	17 54	18 14	18 33	18 53	19 12	19 32	0	0	0	1	1	1	2	2	2	3	3
10	17 6	17 26	17 45	18 5	18 24	18 43	19 3	19 22	10	3	3	4	4	4	5	5	5	6	6
20	16 58	17 17	17 36	17 55	18 15	18 34	18 53	19 12	20	6	7	7	7	8	8	8	9	9	9
30	16 49	17 8	17 27	17 46	18 5	18 24	18 43	19 2	30	10	10	10	10	11	11	11	12	12	12
40	16 40	16 59	17 18	17 37	17 56	18 15	18 33	18 52	40	13	13	13	14	14	14	15	15	15	16
50	16 32	16 50	17 9	17 28	17 46	18 5	18 24	18 42	50	16	16	16	17	17	17	18	18	18	19
72 0	16 23	16 41	17 0	17 18	17 37	17 55	18 14	18 32	0	0	0	1	1	1	2	2	2	2	3
10	16 14	16 32	16 51	17 9	17 27	17 46	18 4	18 23	10	3	3	4	4	4	5	5	5	5	6
20	16 5	16 23	16 42	17 0	17 18	17 36	17 54	18 13	20	6	6	7	7	7	8	8	8	8	9
30	15 56	16 14	16 32	16 50	17 9	17 27	17 45	18 3	30	9	9	10	10	10	11	11	11	11	12
40	15 47	16 5	16 23	16 41	16 59	17 17	17 35	17 53	40	12	12	13	13	13	14	14	14	14	15
50	15 39	15 56	16 14	16 32	16 50	17 7	17 25	17 43	50	15	15	16	16	16	17	17	17	17	18
73 0	15 30	15 47	16 5	16 22	16 40	16 58	17 15	17 33	0	0	0	1	1	1	1	2	2	2	3
10	15 21	15 38	15 56	16 13	16 31	16 48	17 5	17 23	10	3	3	3	4	4	5	5	5	5	5
20	15 12	15 29	15 47	16 4	16 21	16 38	16 55	17 13	20	6	6	6	7	7	7	7	8	8	8
30	15 3	15 20	15 37	15 54	16 11	16 29	16 46	17 3	30	9	9	9	9	10	10	10	11	11	11
40	14 55	15 11	15 28	15 45	16 2	16 19	16 36	16 53	40	11	12	12	12	12	13	13	13	14	14
50	14 46	15 2	15 19	15 36	15 52	16 9	16 26	16 43	50	14	14	15	15	15	16	16	16	16	17
74 0	14 37	14 53	15 10	15 26	15 43	15 59	16 16	16 32	0	0	0	1	1	1	1	2	2	2	2
10	14 28	14 44	15 0	15 17	15 33	15 50	16 6	16 22	10	3	3	3	3	4	4	4	5	5	5
20	14 19	14 35	14 51	15 8	15 24	15 40	15 56	16 12	20	5	6	6	6	6	7	7	7	7	8
30	14 10	14 26	14 42	14 58	15 14	15 30	15 46	16 2	30	8	8	9	9	9	9	10	10	10	10
40	14 1	14 17	14 33	14 49	15 5	15 20	15 36	15 52	40	11	11	11	11	12	12	12	13	13	13
50	13 52	14 8	14 24	14 39	14 55	15 11	15 26	15 42	50	13	14	14	14	14	15	15	15	15	16
75 0	13 43	13 59	14 14	14 30	14 45	15 1	15 16	15 32	0	0	0	1	1	1	1	2	2	2	2
10	13 34	13 50	14 5	14 20	14 36	14 51	15 7	15 22	10	3	3	3	3	4	4	4	4	5	5
20	13 25	13 41	13 56	14 11	14 26	14 41	14 57	15 12	20	5	5	6	6	6	6	7	7	7	7
30	13 16	13 31	13 47	14 2	14 17	14 32	14 47	15 2	30	8	8	8	8	9	9	9	9	10	10
40	13 8	13 22	13 37	13 52	14 7	14 22	14 37	14 52	40	10	10	11	11	11	11	12	12	12	12
50	12 59	13 13	13 28	13 43	13 57	14 12	14 27	14 41	50	13	13	13	13	14	14	14	14	15	15
76 0	12 49	13 4	13 19	13 33	13 48	14 2	14 17	14 31	0	0	0	0	1	1	1	1	2	2	2
10	12 41	12 55	13 9	13 24	13 38	13 52	14 7	14 21	10	2	3	3	3	3	4	4	4	4	4
20	12 32	12 46	13 0	13 14	13 28	13 43	13 57	14 11	20	5	5	5	5	6	6	6	6	7	7
30	12 23	12 37	12 51	13 5	13 19	13 33	13 47	14 1	30	7	7	7	8	8	8	8	9	9	9
40	12 13	12 27	12 41	12 55	13 9	13 23	13 36	13 51	40	9	10	10	10	10	10	11	11	11	11
50	12 4	12 18	12 32	12 45	12 59	13 13	13 26	13 41	50	12	12	12	12	13	13	13	13	14	14
77 0	11 56	12 9	12 23	12 36	12 50	13 3	13 16	13 30	0	0	0	0	1	1	1	1	2	2	2
10	11 47	11 59	12 13	12 26	12 40	12 53	13 6	13 20	10	2	2	3	3	3	4	4	4	4	4
20	11 38	11 50	12 4	12 17	12 30	12 43	12 56	13 10	20	4	5	5	5	5	6	6	6	6	6
30	11 29	11 41	11 54	12 7	12 21	12 34	12 46	13 0	30	7	7	7	7	7	8	8	8	8	9
40	11 20	11 32	11 45	11 58	12 11	12 24	12 36	12 50	40	9	9	9	9	10	10	10	10	10	11
50	11 11	11 23	11 36	11 48	12 1	12 14	12 26	12 39	50	11	11	11	12	12	12	12	12	13	13
78 0	11 1	11 14	11 26	11 39	11 51	12 4	12 16	12 29	0	0	0	0	1	1	1	1	1	2	2
10	10 52	11 5	11 17	11 29	11 42	11 54	12 6	12 19	10	2	2	2	3	3	3	3	3	4	4
20	10 43	10 55	11 8	11 20	11 32	11 44	11 56	12 8	20	4	4	4	5	5	5	5	5	6	6
30	10 34	10 46	10 58	11 10	11 22	11 34	11 46	11 58	30	6	6	6	7	7	7	7	7	8	8
40	10 25	10 37	10 49	11 1	11 12	11 24	11 36	11 48	40	8	8	8	9	9	9	9	9	10	10
50	10 16	10 28	10 39	10 51	11 3	11 14	11 26	11 38	50	10	10	10	11	11	11	11	11	12	12
79 0	10 7	10 19	10 30	10 41	10 53	11 4	11 16	11 27	0	0	0	0	1	1	1	1	1	1	2
10	9 58	10 9	10 21	10 32	10 43	10 54	11 6	11 17	10	2	2	2	2	3	3	3	3	3	3
20	9 49	10 0	10 11	10 22	10 33	10 44	10 56	11 7	20	4	4	4	4	4	5	5	5	5	5
30	9 40	9 51	10 2	10 13	10 24	10 35	10 45	10 56	30	5	6	6	6	6	6	7	7	7	7
40	9 31	9 42	9 52	10 3	10 14	10 25	10 35	10 46	40	7	7	8	8	8	8	8	9	9	9
50	9 22	9 32	9 43	9 53	10 4	10 15	10 25	10 36	50	9	9	9	9	10	10	10	11	11	11
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

TABLE VII.—Correction of the Moon's Apparent Altitude. [*additive.*]

App Alt.	Horizontal Parallax.								Proportional Parts to Seconds of Parallax.										
	54′	55′	56′	57′	58′	59′	60′	61′	″	″ 0	″ 1	″ 2	″ 3	″ 4	″ 5	″ 6	″ 7	″ 8	″ 9
° ′	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″	′ ″											
80 0	9 13	9 23	9 33	9 44	9 54	10 5	10 15	10 26	0	0	0	0	0	1	1	1	1	1	1
10	9 3	9 14	9 24	9 34	9 44	9 55	10 5	10 15	10	2	2	2	2	2	3	3	3	3	3
20	8 54	9 4	9 14	9 25	9 35	9 45	9 55	10 5	20	3	3	4	4	4	4	4	5	5	
30	8 45	8 55	9 5	9 15	9 25	9 35	9 45	9 55	30	5	5	5	5	6	6	6	6	6	6
40	8 36	8 46	8 56	9 5	9 15	9 25	9 34	9 44	40	7	7	7	7	7	7	8	8	8	8
50	8 27	8 37	8 46	8 56	9 5	9 15	9 24	9 34	50	8	8	9	9	9	9	9	9	10	10
81 0	8 18	8 27	8 37	8 46	8 55	9 5	9 14	9 24	0	0	0	0	0	1	1	1	1	1	1
10	8 9	8 18	8 27	8 36	8 46	8 55	9 4	9 13	10	1	2	2	2	2	2	3	3	3	
20	8 0	8 9	8 18	8 27	8 36	8 45	8 54	9 3	20	3	3	3	3	4	4	4	4	4	
30	7 50	7 59	8 8	8 17	8 26	8 35	8 44	8 52	30	4	5	5	5	5	5	5	6	6	
40	7 41	7 50	7 59	8 7	8 16	8 25	8 33	8 42	40	6	6	6	6	7	7	7	7	7	
50	7 32	7 41	7 49	7 58	8 6	8 15	8 23	8 32	50	7	8	8	8	8	8	8	8	9	9
82 0	7 23	7 31	7 40	7 48	7 56	8 5	8 13	8 21	0	0	0	0	0	1	1	1	1	1	1
10	7 14	7 22	7 30	7 38	7 46	7 55	8 3	8 11	10	1	1	2	2	2	2	2	2	2	
20	7 5	7 13	7 21	7 29	7 37	7 45	7 53	8 1	20	3	3	3	3	3	3	4	4	4	
30	6 55	7 3	7 11	7 19	7 27	7 35	7 42	7 50	30	4	4	4	4	4	5	5	5	5	
40	6 46	6 54	7 2	7 9	7 17	7 25	7 32	7 40	40	5	5	5	6	6	6	6	6	6	
50	6 37	6 45	6 52	6 59	7 7	7 14	7 22	7 29	50	7	7	7	7	7	7	7	8	8	
83 0	6 28	6 35	6 42	6 50	6 57	7 4	7 12	7 19	0	0	0	0	0	0	1	1	1	1	1
10	6 19	6 26	6 33	6 40	6 47	6 54	7 2	7 9	10	1	1	1	1	2	2	2	2	2	
20	6 10	6 16	6 23	6 30	6 37	6 44	6 51	6 58	20	2	2	2	3	3	3	3	3	3	
30	6 0	6 7	6 14	6 21	6 27	6 34	6 41	6 48	30	3	4	4	4	4	4	4	4	4	
40	5 51	5 58	6 4	6 11	6 18	6 24	6 31	6 37	40	5	5	5	5	5	5	5	5	6	
50	5 42	5 49	5 55	6 1	6 8	6 14	6 21	6 27	50	6	6	6	6	6	6	6	7	7	
84 0	5 32	5 39	5 45	5 52	5 58	6 4	6 10	6 17	0	0	0	0	0	0	0	1	1	1	1
10	5 23	5 30	5 36	5 42	5 48	5 54	6 0	6 6	10	1	1	1	1	1	1	2	2	2	
20	5 14	5 20	5 26	5 32	5 38	5 44	5 50	5 56	20	2	2	2	2	2	2	3	3	3	
30	5 5	5 11	5 17	5 22	5 28	5 34	5 40	5 45	30	3	3	3	3	3	3	3	4	4	
40	4 56	5 1	5 7	5 13	5 18	5 24	5 29	5 35	40	4	4	4	4	4	4	4	5	5	
50	4 47	4 52	4 57	5 3	5 8	5 14	5 19	5 24	50	5	5	5	5	5	5	5	5	6	6
85 0	4 37	4 43	4 48	4 53	4 58	5 4	5 9	5 14	0	0	0	0	0	0	0	0	1	1	1
10	4 28	4 33	4 38	4 43	4 48	4 53	4 59	5 4	10	1	1	1	1	1	1	1	1	1	
20	4 19	4 24	4 29	4 34	4 38	4 43	4 48	4 53	20	2	2	2	2	2	2	2	2	2	
30	4 10	4 14	4 19	4 24	4 29	4 33	4 38	4 43	30	2	2	2	3	3	3	3	3	3	
40	4 1	4 5	4 10	4 14	4 19	4 23	4 28	4 32	40	3	3	3	3	3	4	4	4	4	
50	3 51	3 56	4 0	4 4	4 9	4 13	4 17	4 22	50	4	4	4	4	4	4	4	4	5	5
86 0	3 42	3 46	3 50	3 55	3 59	4 3	4 7	4 11	0	0	0	0	0	0	0	0	0	0	1
10	3 33	3 37	3 41	3 45	3 49	3 53	3 57	4 1	10	1	1	1	1	1	1	1	1	1	
20	3 24	3 27	3 31	3 35	3 39	3 43	3 47	3 50	20	1	1	1	1	2	2	2	2	2	
30	3 14	3 18	3 22	3 25	3 29	3 33	3 36	3 40	30	2	2	2	2	2	2	2	2	2	
40	3 5	3 9	3 12	3 15	3 19	3 23	3 26	3 29	40	2	3	3	3	3	3	3	3	3	
50	2 56	2 59	3 2	3 5	3 9	3 12	3 16	3 19	50	3	3	3	3	3	3	3	4	4	
87 0	2 47	2 50	2 53	2 56	2 59	3 2	3 5	3 9	0	0	0	0	0	0	0	0	0	0	0
10	2 37	2 40	2 43	2 46	2 49	2 52	2 55	2 58	10	0	0	1	1	1	1	1	1	1	
20	2 28	2 31	2 34	2 36	2 39	2 42	2 45	2 48	20	1	1	1	1	1	2	2	2	2	
30	2 19	2 21	2 24	2 27	2 29	2 32	2 35	2 37	30	1	1	1	1	2	2	2	2	2	
40	2 10	2 12	2 14	2 17	2 19	2 22	2 24	2 27	40	2	2	2	2	2	2	2	2	2	
50	2 0	2 3	2 5	2 7	2 9	2 12	2 14	2 16	50	2	2	2	2	2	2	2	3	3	
88 0	1 51	1 53	1 55	1 57	1 59	2 2	2 4	2 6	0	0	0	0	0	0	0	0	0	0	0
10	1 42	1 44	1 46	1 48	1 50	1 51	1 53	1 55	10	0	0	0	0	0	0	0	0	0	
20	1 33	1 34	1 36	1 38	1 40	1 41	1 43	1 45	20	1	1	1	1	1	1	1	1	1	
30	1 23	1 25	1 26	1 28	1 30	1 31	1 33	1 34	30	1	1	1	1	1	1	1	1	1	
40	1 14	1 15	1 17	1 18	1 20	1 21	1 22	1 24	40	1	1	1	1	1	1	1	1	1	
50	1 5	1 6	1 7	1 8	1 10	1 11	1 12	1 13	50	1	1	1	1	1	1	1	2	2	
89 0	0 56	0 57	0 58	0 59	1 0	1 1	1 2	1 3	0	0	0	0	0	0	0	0	0	0	0
10	0 46	0 47	0 48	0 49	0 50	0 51	0 52	0 52	10	0	0	0	0	0	0	0	0	0	
20	0 37	0 38	0 38	0 39	0 40	0 41	0 41	0 42	20	0	0	0	0	0	0	0	0	0	
30	0 28	0 28	0 28	0 29	0 30	0 30	0 31	0 32	30	0	0	0	0	0	0	0	0	0	
40	0 19	0 19	0 19	0 20	0 20	0 20	0 21	0 21	40	0	0	0	0	0	0	0	0	0	
50	0 9	0 9	0 10	0 10	0 10	0 10	0 10	0 10	50	1	1	1	1	1	1	1	1	1	
	54′	55′	56′	57′	58′	59′	60′	61′		0	1	2	3	4	5	6	7	8	9

TABLE VIII.

PROPORTIONAL LOGARITHMS.

Sec.	h. m. 0° 0′	h. m. 0° 1′	h. m. 0° 2′	h. m. 0° 3′	h. m. 0° 4′	h. m. 0° 5′	h. m. 0° 6′	h. m. 0° 7′	h. m. 0° 8′
0	∞	2.2553	1.9542	1.7782	1.6532	1.5563	1.4771	1.4102	1.3522
1	4.0334	2.2481	1.9506	1.7757	1.6514	1.5549	1.4759	1.4091	1.3513
2	3.7324	2.2410	1.9471	1.7734	1.6496	1.5534	1.4747	1.4081	1.3504
3	3.5563	2.2341	1.9435	1.7710	1.6478	1.5520	1.4735	1.4071	1.3495
4	3.4314	2.2272	1.9400	1.7686	1.6460	1.5506	1.4723	1.4061	1.3486
5	3.3345	2.2205	1.9365	1.7663	1.6443	1.5491	1.4711	1.4050	1.3477
6	3.2553	2.2139	1.9331	1.7639	1.6425	1.5477	1.4699	1.4040	1.3468
7	3.1883	2.2073	1.9296	1.7616	1.6407	1.5463	1.4688	1.4030	1.3459
8	3.1303	2.2009	1.9262	1.7593	1.6390	1.5449	1.4676	1.4020	1.3450
9	3.0792	2.1946	1.9228	1.7570	1.6372	1.5435	1.4664	1.4010	1.3441
10	3.0334	2.1883	1.9195	1.7547	1.6355	1.5421	1.4652	1.4000	1.3432
11	2.9920	2.1822	1.9162	1.7524	1.6338	1.5407	1.4640	1.3989	1.3423
12	2.9542	2.1761	1.9128	1.7501	1.6320	1.5393	1.4629	1.3979	1.3415
13	2.9195	2.1701	1.9096	1.7479	1.6303	1.5379	1.4617	1.3969	1.3406
14	2.8873	2.1642	1.9063	1.7456	1.6286	1.5365	1.4606	1.3959	1.3397
15	2.8573	2.1584	1.9031	1.7434	1.6269	1.5351	1.4594	1.3949	1.3388
16	2.8293	2.1526	1.8999	1.7412	1.6252	1.5337	1.4582	1.3939	1.3379
17	2.8030	2.1469	1.8967	1.7390	1.6235	1.5324	1.4571	1.3929	1.3371
18	2.7782	2.1413	1.8935	1.7368	1.6218	1.5310	1.4559	1.3919	1.3362
19	2.7547	2.1358	1.8904	1.7346	1.6201	1.5296	1.4548	1.3910	1.3353
20	2.7324	2.1303	1.8873	1.7324	1.6185	1.5283	1.4536	1.3900	1.3345
21	2.7112	2.1249	1.8842	1.7302	1.6168	1.5269	1.4525	1.3890	1.3336
22	2.6910	2.1196	1.8811	1.7281	1.6151	1.5256	1.4514	1.3880	1.3327
23	2.6717	2.1143	1.8781	1.7259	1.6135	1.5242	1.4502	1.3870	1.3319
24	2.6532	2.1091	1.8751	1.7238	1.6118	1.5229	1.4491	1.3860	1.3310
25	2.6355	2.1040	1.8721	1.7217	1.6102	1.5215	1.4480	1.3851	1.3301
26	2.6185	2.0989	1.8691	1.7196	1.6085	1.5202	1.4468	1.3841	1.3293
27	2.6021	2.0939	1.8661	1.7175	1.6069	1 5189	1.4457	1.3831	1.3284
28	2.5863	2.0889	1.8632	1.7154	1.6053	1.5175	1.4446	1.3821	1.3276
29	2.5710	2.0840	1.8602	1.7133	1.6037	1.5162	1.4435	1.3812	1.3267
30	2.5563	2.0792	1.8573	1.7112	1.6021	1.5149	1.4424	1.3802	1.3259
31	2.5421	2.0744	1.8544	1.7091	1.6005	1.5136	1.4412	1.3792	1.3250
32	2.5283	2.0696	1.8516	1.7071	1.5989	1.5123	1.4401	1.3783	1.3242
33	2.5149	2.0649	1.8487	1.7050	1.5973	1.5110	1.4390	1.3773	1.3233
34	2.5019	2.0603	1.8459	1.7030	1.5957	1.5097	1.4379	1.3764	1.3225
35	2.4894	2.0557	1.8431	1.7010	1.5941	1.5084	1.4368	1.3754	1.3216
36	2.4771	2.0512	1.8403	1.6990	1.5925	1.5071	1.4357	1.3745	1.3208
37	2.4652	2.0467	1.8375	1.6970	1.5909	1.5058	1.4346	1.3735	1.3199
38	2.4536	2.0422	1.8348	1.6950	1.5894	1.5045	1.4335	1.3726	1.3191
39	2.4424	2.0378	1.8320	1.6930	1.5878	1.5032	1.4325	1.3716	1.3183
40	2.4314	2.0334	1.8293	1.6910	1.5863	1.5019	1.4314	1.3707	1.3174
41	2.4206	2.0291	1.8266	1.6890	1.5847	1.5007	1.4303	1.3697	1.3166
42	2.4102	2.0248	1.8239	1.6871	1.5832	1.4994	1.4292	1.3688	1.3158
43	2.4000	2.0206	1.8212	1.6851	1.5816	1.4981	1.4281	1.3678	1.3149
44	2.3900	2.0164	1.8186	1.6832	1.5801	1.4969	1.4270	1.3669	1.3141
45	2.3802	2.0122	1.8159	1.6812	1.5786	1.4956	1.4260	1.3660	1.3133
46	2.3707	2.0081	1.8133	1.6793	1.5771	1.4943	1.4249	1.3650	1.3124
47	2.3613	2.0040	1.8107	1.6774	1.5755	1.4931	1.4238	1.3641	1.3116
48	2.3522	2.0000	1.8081	1.6755	1.5740	1.4918	1.4228	1.3632	1.3108
49	2.3432	1.9960	1.8055	1.6736	1.5725	1.4906	1.4217	1.3623	1.3100
50	2.3345	1.9920	1.8030	1.6717	1.5710	1.4894	1.4206	1.3613	1.3091
51	2.3259	1.9881	1.8004	1.6698	1.5695	1.4881	1.4196	1.3604	1.3083
52	2.3174	1.9842	1.7979	1.6679	1.5680	1.4869	1.4185	1.3595	1.3075
53	2.3091	1.9803	1.7954	1.6661	1.5666	1.4856	1.4175	1.3586	1.3067
54	2.3010	1.9765	1.7929	1.6642	1.5651	1.4844	1.4164	1.3576	1.3059
55	2.2931	1.9727	1.7904	1.6624	1.5636	1.4832	1.4154	1.3567	1.3051
56	2.2852	1.9690	1.7879	1.6605	1.5621	1.4820	1.4143	1.3558	1.3043
57	2.2775	1.9652	1.7855	1.6587	1.5607	1.4808	1.4133	1.3549	1.3034
58	2.2700	1.9615	1.7830	1.6568	1.5592	1.4795	1.4122	1.3540	1.3026
59	2.2626	1.9579	1.7806	1.6550	1.5578	1.4783	1.4112	1.3531	1.3018
60	2.2553	1.9542	1.7782	1.6532	1.5563	1.4771	1.4102	1.3522	1.3010

ec.	h. m. 0° 9′	h. m. 0° 10′	h. m. 0° 11′	h. m. 0° 12′	h. m. 0° 13′	h. m. 0° 14′	h. m. 0° 15′	h. m. 0° 16′	h. m. 0° 17′
0	1.3010	1.2553	1.2139	1.1761	1.1413	1.1091	1.0792	1.0512	1.0248
1	1.3002	1.2545	1.2132	1.1755	1.1408	1.1086	1.0787	1.0507	1.0244
2	1.2994	1.2538	1.2126	1.1749	1.1402	1.1081	1.0782	1.0502	1.0240
3	1.2986	1.2531	1.2119	1.1743	1.1397	1.1076	1.0777	1.0498	1.0235
4	1.2978	1.2524	1.2113	1.1737	1.1391	1.1071	1.0773	1.0493	1.0231
5	1.2970	1.2517	1.2106	1.1731	1.1386	1.1066	1.0768	1.0489	1.0227
6	1.2962	1.2510	1.2099	1.1725	1.1380	1.1061	1.0763	1.0484	1.0223
7	1.2954	1.2502	1.2093	1.1719	1.1374	1.1055	1.0758	1.0480	1.0219
8	1.2946	1.2495	1.2086	1.1713	1.1369	1.1050	1.0753	1.0475	1.0214
9	1.2939	1.2488	1.2080	1.1707	1.1363	1.1045	1.0749	1.0471	1.0210
10	1.2931	1.2481	1.2073	1.1701	1.1358	1.1040	1.0744	1.0467	1.0206
11	1.2923	1.2474	1.2067	1.1695	1.1352	1.1035	1.0739	1.0462	1.0202
12	1.2915	1.2467	1.2061	1.1689	1.1347	1.1030	1.0734	1.0458	1.0197
13	1.2907	1.2460	1.2054	1.1683	1.1342	1.1025	1.0730	1.0453	1.0193
14	1.2899	1.2453	1.2048	1.1677	1.1336	1.1020	1.0725	1.0449	1.0189
15	1.2891	1.2445	1.2041	1.1671	1.1331	1.1015	1.0720	1.0444	1.0185
16	1.2883	1.2438	1.2035	1.1665	1.1325	1.1009	1.0715	1.0440	1.0181
17	1.2876	1.2431	1.2028	1.1660	1.1320	1.1004	1.0711	1.0435	1.0176
18	1.2868	1.2424	1.2022	1.1654	1.1314	1.0999	1.0706	1.0431	1.0172
19	1.2860	1.2417	1.2016	1.1648	1.1309	1.0994	1.0701	1.0426	1.0168
20	1.2852	1.2410	1.2009	1.1642	1.1303	1.0989	1.0696	1.0422	1.0164
21	1.2845	1.2403	1.2003	1.1636	1.1298	1.0984	1.0692	1.0418	1.0160
22	1.2837	1.2396	1.1996	1.1630	1.1292	1.0979	1.0687	1.0413	1.0156
23	1.2829	1.2389	1.1990	1.1624	1.1287	1.0974	1.0682	1.0409	1.0151
24	1.2821	1.2382	1.1984	1.1619	1.1282	1.0969	1.0678	1.0404	1.0147
25	1.2814	1.2375	1.1977	1.1613	1.1276	1.0964	1.0673	1.0400	1.0143
26	1.2806	1.2368	1.1971	1.1607	1.1271	1.0959	1.0668	1.0395	1.0139
27	1.2798	1.2362	1.1965	1.1601	1.1266	1.0954	1.0663	1.0391	1.0135
28	1.2791	1.2355	1.1958	1.1595	1.1260	1.0949	1.0659	1.0387	1.0131
29	1.2783	1.2348	1.1952	1.1589	1.1255	1.0944	1.0654	1.0382	1.0126
30	1.2775	1.2341	1.1946	1.1584	1.1249	1.0939	1.0649	1.0378	1.0122
31	1.2768	1.2334	1.1939	1.1578	1.1244	1.0934	1.0645	1.0374	1.0118
32	1.2760	1.2327	1.1933	1.1572	1.1239	1.0929	1.0640	1.0369	1.0114
33	1.2753	1.2320	1.1927	1.1566	1.1233	1.0924	1.0635	1.0365	1.0110
34	1.2745	1.2313	1.1921	1.1561	1.1228	1.0919	1.0631	1.0360	1.0106
35	1.2738	1.2307	1.1914	1.1555	1.1223	1.0914	1.0626	1.0356	1.0102
36	1.2730	1.2300	1.1908	1.1549	1.1217	1.0909	1.0621	1.0352	1.0098
37	1.2722	1.2293	1.1902	1.1543	1.1212	1.0904	1.0617	1.0347	1.0093
38	1.2715	1.2286	1.1896	1.1538	1.1207	1.0899	1.0612	1.0343	1.0089
39	1.2707	1.2279	1.1889	1.1532	1.1201	1.0894	1.0608	1.0339	1.0085
40	1.2700	1.2272	1.1883	1.1526	1.1196	1.0889	1.0603	1.0334	1.0081
41	1.2692	1.2266	1.1877	1.1520	1.1191	1.0884	1.0598	1.0330	1.0077
42	1.2685	1.2259	1.1871	1.1515	1.1186	1.0880	1.0594	1.0326	1.0073
43	1.2678	1.2252	1.1865	1.1509	1.1180	1.0875	1.0589	1.0321	1.0069
44	1.2670	1.2245	1.1859	1.1503	1.1175	1.0870	1.0585	1.0317	1.0065
45	1.2663	1.2239	1.1852	1.1498	1.1170	1.0865	1.0580	1.0313	1.0061
46	1.2655	1.2232	1.1846	1.1492	1.1164	1.0860	1.0575	1.0308	1.0057
47	1.2648	1.2225	1.1840	1.1486	1.1159	1.0855	1.0571	1.0304	1.0053
48	1.2640	1.2218	1.1834	1.1481	1.1154	1.0850	1.0566	1.0300	1.0049
49	1.2633	1.2212	1.1828	1.1475	1.1149	1.0845	1.0562	1.0295	1.0044
50	1.2626	1.2205	1.1822	1.1469	1.1143	1.0840	1.0557	1.0291	1.0040
51	1.2618	1.2198	1.1816	1.1464	1.1138	1.0835	1.0552	1.0287	1.0036
52	1.2611	1.2192	1.1809	1.1458	1.1133	1.0831	1.0548	1.0282	1.0032
53	1.2604	1.2185	1.1803	1.1452	1.1128	1.0826	1.0543	1.0278	1.0028
54	1.2596	1.2178	1.1797	1.1447	1.1123	1.0821	1.0539	1.0274	1.0024
55	1.2589	1.2172	1.1791	1.1441	1.1117	1.0816	1.0534	1.0270	1.0020
56	1.2582	1.2165	1.1785	1.1436	1.1112	1.0811	1.0530	1.0265	1.0016
57	1.2574	1.2159	1.1779	1.1430	1.1107	1.0806	1.0525	1.0261	1.0012
58	1.2567	1.2152	1.1773	1.1424	1.1102	1.0801	1.0521	1.0257	1.0008
59	1.2560	1.2145	1.1767	1.1419	1.1097	1.0797	1.0516	1.0252	1.0004
60	1.2553	1.2139	1.1761	1.1413	1.1091	1.0792	1.0512	1.0248	1.0000

Sec.	h. m. 0° 18′	h. m. 0° 19′	h. m. 0° 20′	h. m. 0° 21′	h. m. 0° 22′	h. m. 0° 23′	h. m. 0° 24′	h. m. 0° 25′	h. m. 0° 26′	h. m. 0° 27′	h. m. 0° 28′	h. m. 0° 29′
0	10000	9765	9542	9331	9128	8935	8751	8573	8403	8239	8081	7929
1	9996	9761	9539	9327	9125	8932	8748	8570	8400	8236	8079	7926
2	9992	9758	9535	9324	9122	8929	8745	8568	8397	8234	8076	7924
3	9988	9754	9532	9320	9119	8926	8742	8565	8395	8231	8073	7921
4	9984	9750	9528	9317	9115	8923	8739	8562	8392	8228	8071	7919
5	9980	9746	9524	9313	9112	8920	8736	8559	8389	8226	8068	7916
6	9976	9742	9521	9310	9109	8917	8733	8556	8386	8223	8066	7914
7	9972	9739	9517	9306	9106	8913	8730	8553	8384	8220	8063	7911
8	9968	9735	9514	9303	9102	8910	8727	8550	8381	8218	8061	7909
9	9964	9731	9510	9300	9099	8907	8724	8547	8378	8215	8058	7906
10	9960	9727	9506	9296	9096	8904	8721	8544	8375	8212	8055	7904
11	9956	9723	9503	9293	9092	8901	8718	8542	8372	8210	8053	7901
12	9952	9720	9499	9289	9089	8898	8715	8539	8370	8207	8050	7899
13	9948	9716	9496	9286	9086	8895	8712	8536	8367	8204	8048	7896
14	9944	9712	9492	9283	9083	8892	8709	8533	8364	8202	8045	7894
15	9940	9708	9488	9279	9079	8888	8706	8530	8361	8199	8043	7891
16	9936	9705	9485	9276	9076	8885	8703	8527	8359	8196	8040	7889
17	9932	9701	9481	9272	9073	8882	8700	8524	8356	8194	8037	7887
18	9928	9697	9478	9269	9070	8879	8697	8522	8353	8191	8035	7884
19	9924	9693	9474	9266	9066	8876	8694	8519	8350	8188	8032	7882
20	9920	9690	9471	9262	9063	8873	8691	8516	8348	8186	8030	7879
21	9916	9686	9467	9259	9060	8870	8688	8513	8345	8183	8027	7877
22	9912	9682	9464	9255	9057	8867	8685	8510	8342	8181	8025	7874
23	9908	9678	9460	9252	9053	8864	8682	8507	8339	8178	8022	7872
24	9905	9675	9456	9249	9050	8861	8679	8504	8337	8175	8020	7869
25	9901	9671	9453	9245	9047	8857	8676	8502	8334	8173	8017	7867
26	9897	9667	9449	9242	9044	8854	8673	8499	8331	8170	8014	7864
27	9893	9664	9446	9238	9041	8851	8670	8496	8328	8167	8012	7862
28	9889	9660	9442	9235	9037	8848	8667	8493	8326	8165	8009	7859
29	9885	9656	9439	9232	9034	8845	8664	8490	8323	8162	8007	7857
30	9881	9652	9435	9228	9031	8842	8661	8487	8320	8159	8004	7855
31	9877	9649	9432	9225	9028	8839	8658	8484	8318	8157	8002	7852
32	9873	9645	9428	9222	9024	8836	8655	8482	8315	8154	7999	7850
33	9869	9641	9425	9218	9021	8833	8652	8479	8312	8152	7997	7847
34	9865	9638	9421	9215	9018	8830	8649	8476	8309	8149	7994	7845
35	9861	9634	9418	9212	9015	8827	8646	8473	8307	8146	7992	7842
36	9858	9630	9414	9208	9012	8824	8643	8470	8304	8144	7989	7840
37	9854	9626	9411	9205	9008	8821	8640	8467	8301	8141	7987	7837
38	9850	9623	9407	9201	9005	8817	8637	8465	8298	8138	7984	7835
39	9846	9619	9404	9198	9002	8814	8635	8462	8296	8136	7981	7832
40	9842	9615	9400	9195	8999	8811	8632	8459	8293	8133	7979	7830
41	9838	9612	9396	9191	8996	8808	8629	8456	8290	8131	7976	7828
42	9834	9608	9393	9188	8992	8805	8626	8453	8288	8128	7974	7825
43	9830	9604	9390	9185	8989	8802	8623	8451	8285	8125	7971	7823
44	9827	9601	9386	9181	8986	8799	8620	8448	8282	8123	7969	7820
45	9823	9597	9383	9178	8983	8796	8617	8445	8279	8120	7966	7818
46	9819	9593	9379	9175	8980	8793	8614	8442	8277	8117	7964	7815
47	9815	9590	9376	9172	8977	8790	8611	8439	8274	8115	7961	7813
48	9811	9586	9372	9168	8973	8787	8608	8437	8271	8112	7959	7811
49	9807	9582	9369	9165	8970	8784	8605	8434	8269	8110	7956	7808
50	9803	9579	9365	9162	8967	8781	8602	8431	8266	8107	7954	7806
51	9800	9575	9362	9158	8964	8778	8599	8428	8263	8104	7951	7803
52	9796	9571	9358	9155	8961	8775	8597	8425	8261	8102	7949	7801
53	9792	9568	9355	9152	8958	8772	8594	8423	8258	8099	7946	7798
54	9788	9564	9351	9148	8954	8769	8591	8420	8255	8097	7944	7796
55	9784	9561	9348	9145	8951	8766	8588	8417	8253	8094	7941	7794
56	9780	9557	9344	9142	8948	8763	8585	8414	8250	8091	7939	7791
57	9777	9553	9341	9138	8945	8760	8582	8411	8247	8089	7936	7789
58	9773	9550	9337	9135	8942	8757	8579	8409	8244	8086	7934	7786
59	9769	9546	9334	9132	8939	8754	8576	8406	8242	8084	7931	7784
60	9765	9542	9331	9128	8935	8751	8573	8403	8239	8081	7929	7782

Sec.	h. m. 0° 30′	h. m. 0° 31′	h. m. 0° 32′	h. m. 0° 33′	h. m. 0° 34′	h. m. 0° 35′	h. m. 0° 36′	h. m. 0° 37′	h. m. 0° 38′	h. m. 0° 39′	h. m. 0° 40′	h. m. 0° 41′
0	7782	7639	7501	7368	7238	7112	6990	6871	6755	6642	6532	6425
1	7779	7637	7499	7365	7236	7110	6988	6869	6753	6640	6530	6423
2	7777	7634	7497	7363	7234	7108	6986	6867	6751	6638	6529	6421
3	7774	7632	7494	7361	7232	7106	6984	6865	6749	6637	6527	6420
4	7772	7630	7492	7359	7229	7104	6982	6863	6747	6635	6525	6418
5	7769	7627	7490	7357	7227	7102	6980	6861	6745	6633	6523	6416
6	7767	7625	7488	7354	7225	7100	6978	6859	6743	6631	6521	6414
7	7765	7623	7485	7352	7223	7098	6976	6857	6742	6629	6519	6413
8	7762	7620	7483	7350	7221	7096	6974	6855	6740	6627	6518	6411
9	7760	7618	7481	7348	7219	7093	6972	6853	6738	6625	6516	6409
10	7757	7616	7479	7346	7217	7091	6970	6851	6736	6624	6514	6407
11	7755	7613	7476	7344	7215	7089	6968	6849	6734	6622	6512	6406
12	7753	7611	7474	7341	7212	7087	6966	6847	6732	6620	6510	6404
13	7750	7609	7472	7339	7210	7085	6964	6845	6730	6618	6509	6402
14	7748	7607	7470	7337	7208	7083	6962	6843	6728	6616	6507	6400
15	7745	7604	7467	7335	7206	7081	6960	6841	6726	6614	6505	6398
16	7743	7602	7465	7333	7204	7079	6958	6840	6725	6612	6503	6397
17	7741	7600	7463	7330	7202	7077	6956	6838	6723	6611	6501	6395
18	7738	7597	7461	7328	7200	7075	6954	6836	6721	6609	6500	6393
19	7736	7595	7458	7326	7198	7073	6952	6834	6719	6607	6498	6391
20	7734	7593	7456	7324	7196	7071	6950	6832	6717	6605	6496	6390
21	7731	7590	7454	7322	7193	7069	6948	6830	6715	6603	6494	6388
22	7729	7588	7452	7320	7191	7067	6946	6828	6713	6601	6492	6386
23	7726	7586	7450	7317	7189	7065	6944	6826	6711	6600	6491	6384
24	7724	7583	7447	7315	7187	7063	6942	6824	6709	6598	6489	6383
25	7722	7581	7445	7313	7185	7061	6940	6822	6708	6596	6487	6381
26	7719	7579	7443	7311	7183	7059	6938	6820	6706	6594	6485	6379
27	7717	7577	7441	7309	7181	7057	6936	6818	6704	6592	6484	6377
28	7714	7574	7438	7307	7179	7055	6934	6816	6702	6590	6482	6376
29	7712	7572	7436	7304	7177	7052	6932	6814	6700	6589	6480	6374
30	7710	7570	7434	7302	7175	7050	6930	6812	6698	6587	6478	6372
31	7707	7567	7432	7300	7172	7048	6928	6810	6696	6585	6476	6371
32	7705	7565	7429	7298	7170	7046	6926	6809	6694	6583	6475	6369
33	7703	7563	7427	7296	7168	7044	6924	6807	6692	6581	6473	6367
34	7700	7560	7425	7294	7166	7042	6922	6805	6691	6579	6471	6365
35	7698	7558	7423	7291	7164	7040	6920	6803	6689	6578	6469	6364
36	7696	7556	7421	7289	7162	7038	6918	6801	6687	6576	6467	6362
37	7693	7554	7418	7287	7160	7036	6916	6799	6685	6574	6466	6360
38	7691	7551	7416	7285	7158	7034	6914	6797	6683	6572	6464	6358
39	7688	7549	7414	7283	7156	7032	6912	6795	6681	6570	6462	6357
40	7686	7547	7412	7281	7154	7030	6910	6793	6679	6568	6460	6355
41	7684	7544	7409	7279	7152	7028	6908	6791	6677	6567	6459	6353
42	7681	7542	7407	7276	7149	7026	6906	6789	6676	6565	6457	6351
43	7679	7540	7405	7274	7147	7024	6904	6787	6674	6563	6455	6350
44	7677	7538	7403	7272	7145	7022	6902	6785	6672	6561	6453	6348
45	7674	7535	7401	7270	7143	7020	6900	6784	6670	6559	6451	6346
46	7672	7533	7398	7268	7141	7018	6898	6782	6668	6558	6450	6344
47	7670	7531	7396	7266	7139	7016	6896	6780	6666	6556	6448	6343
48	7667	7528	7394	7264	7137	7014	6894	6778	6664	6554	6446	6341
49	7665	7526	7392	7261	7135	7012	6892	6776	6663	6552	6444	6339
50	7663	7524	7390	7259	7133	7010	6890	6774	6661	6550	6443	6338
51	7660	7522	7387	7257	7131	7008	6888	6772	6659	6548	6441	6336
52	7658	7519	7385	7255	7129	7006	6886	6770	6657	6547	6439	6334
53	7655	7517	7383	7253	7127	7004	6884	6768	6655	6545	6437	6332
54	7653	7515	7381	7251	7124	7002	6882	6766	6653	6543	6435	6331
55	7651	7513	7379	7249	7122	7000	6881	6764	6651	6541	6434	6329
56	7648	7510	7376	7246	7120	6998	6879	6763	6650	6539	6432	6327
57	7646	7508	7374	7244	7118	6996	6877	6761	6648	6538	6430	6325
58	7644	7506	7372	7242	7116	6994	6875	6759	6646	6536	6428	6324
59	7641	7503	7370	7240	7114	6992	6873	6757	6644	6534	6427	6322
60	7639	7501	7368	7238	7112	6990	6871	6755	6642	6532	6425	6320

Sec.	h. m. 0° 42′	h. m. 0° 43′	h. m. 0° 44′	h. m. 0° 45′	h. m. 0° 46′	h. m. 0° 47′	h. m. 0° 48′	h. m. 0° 49′	h. m. 0° 50′	h. m. 0° 51′	h. m. 0° 52′	h. m 0° 53′
0	6320	6218	6118	6021	5925	5832	5740	5651	5563	5477	5393	5310
1	6319	6216	6117	6019	5924	5830	5739	5649	5562	5476	5391	5309
2	6317	6215	6115	6017	5922	5829	5737	5648	5560	5474	5390	5307
3	6315	6213	6113	6016	5920	5827	5736	5646	5559	5473	5389	5306
4	6313	6211	6112	6014	5919	5826	5734	5645	5557	5471	5387	5305
5	6312	6210	6110	6013	5917	5824	5733	5643	5556	5470	5386	5303
6	6310	6208	6108	6011	5916	5823	5731	5642	5554	5469	5384	5302
7	6308	6206	6107	6009	5914	5821	5730	5640	5553	5467	5383	5300
8	6306	6205	6105	6008	5913	5819	5728	5639	5551	5466	5382	5299
9	6305	6203	6103	6006	5911	5818	5727	5637	5550	5464	5380	5298
10	6303	6201	6102	6005	5909	5816	5725	5636	5549	5463	5379	5296
11	6301	6200	6100	6003	5908	5815	5724	5635	5547	5461	5377	5295
12	6300	6198	6099	6001	5906	5813	5722	5633	5546	5460	5376	5294
13	6298	6196	6097	6000	5905	5812	5721	5632	5544	5459	5375	5292
14	6296	6195	6095	5998	5903	5810	5719	5630	5543	5457	5373	5291
15	6294	6193	6094	5997	5902	5809	5718	5629	5541	5456	5372	5290
16	6293	6191	6092	5995	5900	5807	5716	5627	5540	5454	5370	5288
17	6291	6190	6090	5993	5898	5806	5715	5626	5538	5453	5369	5287
18	6289	6188	6089	5992	5897	5804	5713	5624	5537	5452	5368	5285
19	6288	6186	6087	5990	5895	5803	5712	5623	5536	5450	5366	5284
20	6286	6185	6085	5989	5894	5801	5710	5621	5534	5449	5365	5283
21	6284	6183	6084	5987	5892	5800	5709	5620	5533	5447	5364	5281
22	6282	6181	6082	5985	5891	5798	5707	5618	5531	5446	5362	5280
23	6281	6179	6081	5984	5889	5796	5706	5617	5530	5445	5361	5279
24	6279	6178	6079	5982	5888	5795	5704	5615	5528	5443	5359	5277
25	6277	6176	6077	5981	5886	5793	5703	5614	5527	5442	5358	5276
26	6276	6174	6076	5979	5884	5792	5701	5613	5526	5440	5357	5275
27	6274	6173	6074	5977	5883	5790	5700	5611	5524	5439	5355	5273
28	6272	6171	6072	5976	5881	5789	5698	5610	5523	5437	5354	5272
29	6271	6169	6071	5974	5880	5787	5697	5608	5521	5436	5353	5271
30	6269	6168	6069	5973	5878	5786	5695	5607	5520	5435	5351	5269
31	6267	6166	6067	5971	5877	5784	5694	5605	5518	5433	5350	5268
32	6265	6165	6066	5969	5875	5783	5692	5604	5517	5432	5348	5266
33	6264	6163	6064	5968	5874	5781	5691	5602	5516	5430	5347	5265
34	6262	6161	6063	5966	5872	5780	5689	5601	5514	5429	5346	5264
35	6260	6160	6061	5965	5870	5778	5688	5599	5513	5428	5344	5262
36	6259	6158	6059	5963	5869	5777	5686	5598	5511	5426	5343	5261
37	6257	6156	6058	5961	5867	5775	5685	5596	5510	5425	5341	5260
38	6255	6155	6056	5960	5866	5774	5683	5595	5508	5423	5340	5258
39	6254	6153	6055	5958	5864	5772	5682	5594	5507	5422	5339	5257
40	6252	6151	6053	5957	5863	5771	5680	5592	5506	5421	5337	5256
41	6250	6150	6051	5955	5861	5769	5679	5591	5504	5419	5336	5254
42	6248	6148	6050	5954	5860	5768	5677	5589	5503	5418	5335	5253
43	6247	6146	6048	5952	5858	5766	5676	5588	5501	5416	5333	5252
44	6245	6145	6046	5950	5856	5765	5674	5586	5500	5415	5332	5250
45	6243	6143	6045	5949	5855	5763	5673	5585	5498	5414	5331	5249
46	6242	6141	6043	5947	5853	5761	5671	5583	5497	5412	5329	5248
47	6240	6140	6042	5946	5852	5760	5670	5582	5496	5411	5328	5246
48	6238	6138	6040	5944	5850	5758	5669	5580	5494	5409	5326	5245
49	6237	6136	6038	5942	5849	5757	5667	5579	5493	5408	5325	5244
50	6235	6135	6037	5941	5847	5755	5666	5578	5491	5407	5324	5242
51	6233	6133	6035	5939	5846	5754	5664	5576	5490	5405	5322	5241
52	6232	6131	6033	5938	5844	5752	5663	5575	5488	5404	5321	5240
53	6230	6130	6032	5936	5843	5751	5661	5573	5487	5402	5320	5238
54	6228	6128	6030	5935	5841	5749	5660	5572	5486	5401	5318	5237
55	6226	6126	6029	5933	5839	5748	5658	5570	5484	5400	5317	5235
56	6225	6125	6027	5931	5838	5746	5657	5569	5483	5398	5315	5234
57	6223	6123	6025	5930	5836	5745	5655	5567	5481	5397	5314	5233
58	6221	6121	6024	5928	5835	5743	5654	5566	5480	5395	5313	5231
59	6220	6120	6022	5927	5833	5742	5652	5564	5478	5394	5311	5230
60	6218	6118	6021	5925	5832	5740	5651	5563	5477	5393	5310	5229

sec.	h. m. 0° 54′	h. m. 0° 55′	h. m. 0° 56′	h. m. 0° 57′	h. m. 0° 58′	h. m. 0° 59′	h. m. 1° 0′	h. m. 1° 1′	h. m. 1° 2′	h. m. 1° 3′	h. m. 1° 4′	h. m. 1° 5′
0	5229	5149	5071	4994	4918	4844	4771	4699	4629	4559	4491	4424
1	5227	5148	5070	4993	4917	4843	4770	4698	4628	4558	4490	4422
2	5226	5146	5068	4991	4916	4842	4769	4697	4626	4557	4489	4421
3	5225	5145	5067	4990	4915	4841	4768	4696	4625	4556	4488	4420
4	5223	5144	5066	4989	4913	4839	4766	4695	4624	4555	4486	4419
5	5222	5143	5064	4988	4912	4838	4765	4693	4623	4554	4485	4418
6	5221	5141	5063	4986	4911	4837	4764	4692	4622	4552	4484	4417
7	5219	5140	5062	4985	4910	4836	4763	4691	4621	4551	4483	4416
8	5218	5139	5061	4984	4908	4834	4762	4690	4619	4550	4482	4415
9	5217	5137	5059	4983	4907	4833	4760	4689	4618	4549	4481	4414
10	5215	5136	5058	4981	4906	4832	4759	4688	4617	4548	4480	4412
11	5214	5135	5057	4980	4905	4831	4758	4686	4616	4547	4479	4411
12	5213	5133	5055	4979	4903	4830	4757	4685	4615	4546	4477	4410
13	5211	5132	5054	4977	4902	4828	4756	4684	4614	4544	4476	4409
14	5210	5131	5053	4976	4901	4827	4754	4683	4612	4543	4475	4408
15	5209	5129	5051	4975	4900	4826	4753	4682	4611	4542	4474	4407
16	5207	5128	5050	4974	4899	4825	4752	4680	4610	4541	4473	4406
17	5206	5127	5049	4972	4897	4823	4751	4679	4609	4540	4472	4405
18	5205	5125	5048	4971	4896	4822	4750	4678	4608	4539	4471	4404
19	5203	5124	5046	4970	4895	4821	4748	4677	4607	4538	4469	4402
20	5202	5123	5045	4969	4894	4820	4747	4676	4606	4536	4468	4401
21	5201	5122	5044	4967	4892	4819	4746	4675	4604	4535	4467	4400
22	5199	5120	5043	4966	4891	4817	4745	4673	4603	4534	4466	4399
23	5198	5119	5041	4965	4890	4816	4744	4672	4602	4533	4465	4398
24	5197	5118	5040	4964	4889	4815	4742	4671	4601	4532	4464	4397
25	5195	5116	5039	4962	4887	4814	4741	4670	4600	4531	4463	4396
26	5194	5115	5037	4961	4886	4812	4740	4669	4599	4530	4462	4395
27	5193	5114	5036	4960	4885	4811	4739	4668	4597	4528	4460	4394
28	5191	5112	5035	4959	4884	4810	4738	4666	4596	4527	4459	4393
29	5190	5111	5034	4957	4882	4809	4736	4665	4595	4526	4458	4391
30	5189	5110	5032	4956	4881	4808	4735	4664	4594	4525	4457	4390
31	5187	5108	5031	4955	4880	4806	4734	4663	4593	4524	4456	4389
32	5186	5107	5030	4954	4879	4805	4733	4662	4592	4523	4455	4388
33	5185	5106	5028	4952	4877	4804	4732	4660	4590	4522	4454	4387
34	5183	5105	5027	4951	4876	4803	4730	4659	4589	4520	4453	4386
35	5182	5103	5026	4950	4875	4801	4729	4658	4588	4519	4452	4385
36	5181	5102	5025	4949	4874	4800	4728	4657	4587	4518	4450	4384
37	5179	5101	5023	4947	4873	4799	4727	4656	4586	4517	4449	4383
38	5178	5099	5022	4946	4871	4798	4726	4655	4585	4516	4448	4381
39	5177	5098	5021	4945	4870	4797	4724	4653	4584	4515	4447	4380
40	5175	5097	5019	4943	4869	4795	4723	4652	4582	4514	4446	4379
41	5174	5095	5018	4942	4868	4794	4722	4651	4581	4512	4445	4378
42	5173	5094	5017	4941	4866	4793	4721	4650	4580	4511	4444	4377
43	5172	5093	5016	4940	4865	4792	4720	4649	4579	4510	4443	4376
44	5170	5092	5014	4938	4864	4791	4718	4648	4578	4509	4441	4375
45	5169	5090	5013	4937	4863	4789	4717	4646	4577	4508	4440	4374
46	5168	5089	5012	4936	4861	4788	4716	4645	4575	4507	4439	4373
47	5166	5088	5011	4935	4860	4787	4715	4644	4574	4506	4438	4372
48	5165	5086	5009	4933	4859	4786	4714	4643	4573	4505	4437	4370
49	5164	5085	5008	4932	4858	4785	4712	4642	4572	4503	4436	4369
50	5162	5084	5007	4931	4856	4783	4711	4640	4571	4502	4435	4368
51	5161	5082	5005	4930	4855	4782	4710	4639	4570	4501	4434	4367
52	5160	5081	5004	4928	4854	4781	4709	4638	4569	4500	4433	4366
53	5158	5080	5003	4927	4853	4780	4708	4637	4567	4499	4431	4365
54	5157	5079	5002	4926	4852	4778	4707	4636	4566	4498	4430	4364
55	5156	5077	5000	4925	4850	4777	4705	4635	4565	4497	4429	4363
56	5154	5076	4999	4923	4849	4776	4704	4633	4564	4495	4428	4362
57	5153	5075	4998	4922	4848	4775	4703	4632	4563	4494	4427	4361
58	5152	5073	4997	4921	4847	4774	4702	4631	4562	4493	4426	4359
59	5150	5072	4995	4920	4845	4772	4701	4630	4560	4492	4425	4358
60	5149	5071	4994	4918	4844	4771	4699	4629	4559	4491	4424	4357

Sec.	h. m. 1° 6′	h. m. 1° 7′	h. m. 1° 8′	h. m. 1° 9′	h. m. 1° 10′	h. m. 1° 11′	h. m 1° 12′	h. m. 1° 13′	h. m. 1° 14′	h. m. 1° 15′	h. m. 1° 16′	h. m 1° 17′
0	4357	4292	4228	4164	4102	4040	3979	3919	3860	3802	3745	3688
1	4356	4291	4227	4163	4101	4039	3978	3919	3859	3801	3744	3687
2	4355	4290	4226	4162	4100	4038	3977	3918	3858	3800	3743	3686
3	4354	4289	4224	4161	4099	4037	3976	3917	3857	3799	3742	3685
4	4353	4288	4223	4160	4098	4036	3975	3916	3856	3798	3741	3684
5	4352	4287	4222	4159	4097	4035	3974	3915	3856	3797	3740	3683
6	4351	4285	4221	4158	4096	4034	3973	3914	3855	3796	3739	3682
7	4350	4284	4220	4157	4095	4033	3972	3913	3854	3795	3738	3681
8	4349	4283	4219	4156	4093	4032	3971	3912	3853	3794	3737	3680
9	4347	4282	4218	4155	4092	4031	3970	3911	3852	3793	3736	3679
10	4346	4281	4217	4154	4091	4030	3969	3910	3851	3792	3735	3678
11	4345	4280	4216	4153	4090	4029	3968	3909	3850	3792	3734	3677
12	4344	4279	4215	4152	4089	4028	3967	3908	3849	3791	3733	3677
13	4343	4278	4214	4151	4088	4027	3966	3907	3848	3790	3732	3676
14	4342	4277	4213	4150	4087	4026	3965	3906	3847	3789	3731	3675
15	4341	4276	4212	4149	4086	4025	3964	3905	3846	3788	3730	3674
16	4340	4275	4211	4147	4085	4024	3963	3904	3845	3787	3729	3673
17	4339	4274	4210	4146	4084	4023	3962	3903	3844	3786	3728	3672
18	4338	4273	4209	4145	4083	4022	3961	3902	3843	3785	3727	3671
19	4336	4271	4207	4144	4082	4021	3960	3901	3842	3784	3727	3670
20	4335	4270	4206	4143	4081	4020	3959	3900	3841	3783	3726	3669
21	4334	4269	4205	4142	4080	4019	3958	3899	3840	3782	3725	3668
22	4333	4268	4204	4141	4079	4018	3957	3898	3839	3781	3724	3667
23	4332	4267	4203	4140	4078	4017	3956	3897	3838	3780	3723	3666
24	4331	4266	4202	4139	4077	4016	3955	3896	3837	3779	3722	3665
25	4330	4265	4201	4138	4076	4015	3954	3895	3836	3778	3721	3664
26	4329	4264	4200	4137	4075	4014	3953	3894	3835	3777	3720	3663
27	4328	4263	4199	4136	4074	4013	3952	3893	3834	3776	3719	3663
28	4327	4262	4198	4135	4073	4012	3951	3892	3833	3775	3718	3662
29	4326	4261	4197	4134	4072	4011	3950	3891	3832	3774	3717	3661
30	4325	4260	4196	4133	4071	4010	3949	3890	3831	3773	3716	3660
31	4323	4259	4195	4132	4070	4009	3948	3889	3830	3772	3715	3659
32	4322	4258	4194	4131	4069	4008	3947	3888	3829	3771	3714	3658
33	4321	4256	4193	4130	4068	4007	3946	3887	3828	3770	3713	3657
34	4320	4255	4192	4129	4067	4006	3945	3886	3827	3769	3712	3656
35	4319	4254	4191	4128	4066	4005	3944	3885	3826	3768	3711	3655
36	4318	4253	4189	4127	4065	4004	3943	3884	3825	3768	3710	3654
37	4317	4252	4188	4126	4064	4003	3942	3883	3824	3767	3709	3653
38	4316	4251	4187	4125	4063	4002	3941	3882	3823	3766	3709	3652
39	4315	4250	4186	4124	4062	4001	3940	3881	3822	3765	3708	3651
40	4314	4249	4185	4122	4061	4000	3939	3880	3821	3764	3707	3650
41	4313	4248	4184	4121	4060	3999	3938	3879	3820	3763	3706	3649
42	4311	4247	4183	4120	4059	3998	3937	3878	3820	3762	3705	3649
43	4310	4246	4182	4119	4058	3997	3936	3877	3819	3761	3704	3648
44	4309	4245	4181	4118	4056	3996	3935	3876	3818	3760	3703	3647
45	4308	4244	4180	4117	4055	3995	3934	3875	3817	3759	3702	3646
46	4307	4243	4179	4116	4054	3993	3933	3874	3816	3758	3701	3645
47	4306	4241	4178	4115	4053	3992	3932	3873	3815	3757	3700	3644
48	4305	4240	4177	4114	4052	3991	3931	3872	3814	3756	3699	3643
49	4304	4239	4176	4113	4051	3990	3930	3871	3813	3755	3698	3642
50	4303	4238	4175	4112	4050	3989	3929	3870	3812	3754	3697	3641
51	4302	4237	4174	4111	4049	3988	3928	3869	3811	3753	3696	3640
52	4301	4236	4173	4110	4048	3987	3927	3868	3810	3752	3695	3639
53	4300	4235	4172	4109	4047	3986	3926	3867	3809	3751	3694	3638
54	4298	4234	4171	4108	4046	3985	3925	3866	3808	3750	3693	3637
55	4297	4233	4169	4107	4045	3984	3924	3865	3807	3749	3693	3636
56	4296	4232	4168	4106	4044	3983	3923	3864	3806	3748	3692	3635
57	4295	4231	4167	4105	4043	3982	3922	3863	3805	3747	3691	3635
58	4294	4230	4166	4104	4042	3981	3921	3862	3804	3746	3690	3634
59	4293	4229	4165	4103	4041	3980	3920	3861	3803	3746	3689	3633
60	4292	4228	4164	4102	4040	3979	3919	3860	3802	3745	3688	3632

Sec.	h. m. 1° 18′	h. m. 1° 19′	h. m. 1° 20′	h. m. 1° 21′	h. m. 1° 22′	h. m. 1° 23′	h. m. 1° 24′	h. m. 1° 25′	h. m. 1° 26′	h. m. 1° 27′	h. m. 1° 28′	h. m. 1° 29′
0	3632	3576	3522	3468	3415	3362	3310	3259	3208	3158	3108	3059
1	3631	3576	3521	3467	3414	3361	3309	3258	3207	3157	3107	3058
2	3630	3575	3520	3466	3413	3360	3308	3257	3206	3156	3106	3057
3	3629	3574	3519	3465	3412	3359	3307	3256	3205	3155	3105	3056
4	3628	3573	3518	3464	3411	3358	3306	3255	3204	3154	3105	3056
5	3627	3572	3517	3463	3410	3358	3306	3254	3204	3153	3104	3055
6	3626	3571	3516	3463	3409	3357	3305	3253	3203	3153	3103	3054
7	3625	3570	3515	3462	3408	3356	3304	3253	3202	3152	3102	3053
8	3624	3569	3514	3461	3408	3355	3303	3252	3201	3151	3101	3052
9	3623	3568	3514	3460	3407	3354	3302	3251	3200	3150	3101	3052
10	3623	3567	3513	3459	3406	3353	3301	3250	3199	3149	3100	3051
11	3622	3566	3512	3458	3405	3352	3300	3249	3198	3148	3099	3050
12	3621	3565	3511	3457	3404	3351	3300	3248	3198	3148	3098	3049
13	3620	3565	3510	3456	3403	3351	3299	3247	3197	3147	3097	3048
14	3619	3564	3509	3455	3402	3350	3298	3247	3196	3146	3096	3047
15	3618	3563	3508	3454	3401	3349	3297	3246	3195	3145	3096	3047
16	3617	3562	3507	3454	3400	3348	3296	3245	3194	3144	3095	3046
17	3616	3561	3506	3453	3400	3347	3295	3244	3193	3143	3094	3045
18	3615	3560	3506	3452	3399	3346	3294	3243	3193	3143	3093	3044
19	3614	3559	3505	3451	3398	3345	3294	3242	3192	3142	3092	3043
20	3613	3558	3504	3450	3397	3345	3293	3242	3191	3141	3091	3043
21	3612	3557	3503	3449	3396	3344	3292	3241	3190	3140	3091	3042
22	3611	3556	3502	3448	3395	3343	3291	3240	3189	3139	3090	3041
23	3610	3555	3501	3447	3394	3342	3290	3239	3188	3138	3089	3040
24	3610	3555	3500	3446	3393	3341	3289	3238	3188	3138	3088	3039
25	3609	3554	3499	3446	3393	3340	3288	3237	3187	3137	3087	3039
26	3608	3553	3498	3445	3392	3339	3288	3236	3186	3136	3087	3038
27	3607	3552	3497	3444	3391	3338	3287	3236	3185	3135	3086	3037
28	3606	3551	3497	3443	3390	3338	3286	3235	3184	3134	3085	3036
29	3605	3550	3496	3442	3389	3337	3285	3234	3183	3133	3084	3035
30	3604	3549	3495	3441	3388	3336	3284	3233	3183	3133	3083	3034
31	3603	3548	3494	3440	3387	3335	3283	3232	3182	3132	3082	3034
32	3602	3547	3493	3439	3386	3334	3282	3231	3181	3131	3082	3033
33	3601	3546	3492	3438	3386	3333	3282	3231	3180	3130	3081	3032
34	3600	3545	3491	3438	3385	3332	3281	3230	3179	3129	3080	3031
35	3599	3545	3490	3437	3384	3332	3280	3229	3178	3129	3079	3030
36	3598	3544	3489	3436	3383	3331	3279	3228	3178	3128	3078	3030
37	3598	3543	3488	3435	3382	3330	3278	3227	3177	3127	3078	3029
38	3597	3542	3488	3434	3381	3329	3277	3226	3176	3126	3077	3028
39	3596	3541	3487	3433	3380	3328	3276	3225	3175	3125	3076	3027
40	3595	3540	3486	3432	3379	3327	3276	3225	3174	3124	3075	3026
41	3594	3539	3485	3431	3379	3326	3275	3224	3173	3124	3074	3026
42	3593	3538	3484	3431	3378	3325	3274	3223	3173	3123	3073	3025
43	3592	3537	3483	3430	3377	3325	3273	3222	3172	3122	3073	3024
44	3591	3536	3482	3429	3376	3324	3272	3221	3171	3121	3072	3023
45	3590	3535	3481	3428	3375	3323	3271	3220	3170	3120	3071	3022
46	3589	3535	3480	3427	3374	3322	3270	3220	3169	3119	3070	3022
47	3588	3534	3480	3426	3373	3321	3270	3219	3168	3119	3069	3021
48	3587	3533	3479	3425	3372	3320	3269	3218	3168	3118	3069	3020
49	3587	3532	3478	3424	3372	3319	3268	3217	3167	3117	3068	3019
50	3586	3531	3477	3423	3371	3319	3267	3216	3166	3116	3067	3018
51	3585	3530	3476	3423	3370	3318	3266	3215	3165	3115	3066	3018
52	3584	3529	3475	3422	3369	3317	3265	3214	3164	3114	3065	3017
53	3583	3528	3474	3421	3368	3316	3265	3214	3163	3114	3065	3016
54	3582	3527	3473	3420	3367	3315	3264	3213	3163	3113	3064	3015
55	3581	3526	3472	3419	3366	3314	3263	3212	3162	3112	3063	3014
56	3580	3525	3471	3418	3365	3313	3262	3211	3161	3111	3062	3014
57	3579	3525	3471	3417	3365	3313	3261	3210	3160	3110	3061	3013
58	3578	3524	3470	3416	3364	3312	3260	3209	3159	3110	3060	3012
59	3577	3523	3469	3415	3363	3311	3259	3209	3158	3109	3060	3011
60	3576	3522	3468	3415	3362	3310	3259	3208	3158	3108	3059	3010

Sec.	h. m. 1° 30′	h. m. 1° 31′	h. m. 1° 32′	h. m. 1° 33′	h. m. 1° 34′	h. m. 1° 35′	h. m. 1° 36′	h. m. 1° 37′	h. m. 1° 38′	h. m 1° 39′	h. m. 1° 40′	h. m. 1° 41′
0	3010	2962	2915	2868	2821	2775	2730	2685	2640	2596	2553	2510
1	3009	2962	2914	2867	2821	2775	2729	2684	2640	2596	2552	2509
2	3009	2961	2913	2866	2820	2774	2729	2684	2639	2595	2551	2508
3	3008	2960	2912	2866	2819	2773	2728	2683	2638	2594	2551	2507
4	3007	2959	2912	2865	2818	2772	2727	2682	2638	2593	2550	2507
5	3006	2958	2911	2864	2818	2772	2726	2681	2637	2593	2549	2506
6	3005	2958	2910	2863	2817	2771	2725	2681	2636	2592	2548	2505
7	3005	2957	2909	2862	2816	2770	2725	2680	2635	2591	2548	2504
8	3004	2956	2909	2862	2815	2769	2724	2679	2635	2591	2547	2504
9	3003	2955	2908	2861	2815	2769	2723	2678	2634	2590	2546	2503
10	3002	2954	2907	2860	2814	2768	2722	2678	2633	2589	2545	2502
11	3001	2954	2906	2859	2813	2767	2722	2677	2632	2588	2545	2502
12	3001	2953	2905	2859	2812	2766	2721	2676	2632	2588	2544	2501
13	3000	2952	2905	2858	2811	2766	2720	2675	2631	2587	2543	2500
14	2999	2951	2904	2857	2811	2765	2719	2675	2630	2586	2543	2499
15	2998	2950	2903	2856	2810	2764	2719	2674	2629	2585	2542	2499
16	2997	2950	2902	2855	2809	2763	2718	2673	2629	2585	2541	2498
17	2997	2949	2901	2855	2808	2763	2717	2672	2628	2584	2540	2497
18	2996	2948	2901	2854	2808	2762	2716	2672	2627	2583	2540	2497
19	2995	2947	2900	2853	2807	2761	2716	2671	2626	2583	2539	2496
20	2994	2946	2899	2852	2806	2760	2715	2670	2626	2582	2538	2495
21	2993	2946	2898	2852	2805	2760	2714	2669	2625	2581	2538	2494
22	2993	2945	2898	2851	2805	2759	2713	2669	2624	2580	2537	2494
23	2992	2944	2897	2850	2804	2758	2713	2668	2624	2580	2536	2493
24	2991	2943	2896	2849	2803	2757	2712	2667	2623	2579	2535	2492
25	2990	2942	2895	2848	2802	2756	2711	2666	2622	2578	2535	2492
26	2989	2942	2894	2848	2801	2756	2710	2666	2621	2577	2534	2491
27	2989	2941	2894	2847	2801	2755	2710	2665	2621	2577	2533	2490
28	2988	2940	2893	2846	2800	2754	2709	2664	2620	2576	2533	2489
29	2987	2939	2892	2845	2799	2753	2708	2663	2619	2575	2532	2489
30	2986	2939	2891	2845	2798	2753	2707	2663	2618	2574	2531	2488
31	2985	2938	2891	2844	2798	2752	2707	2662	2618	2574	2530	2487
32	2985	2937	2890	2843	2797	2751	2706	2661	2617	2573	2530	2487
33	2984	2936	2889	2842	2796	2750	2705	2660	2616	2572	2529	2486
34	2983	2935	2888	2842	2795	2750	2704	2660	2615	2572	2528	2485
35	2982	2935	2887	2841	2795	2749	2704	2659	2615	2571	2527	2485
36	2981	2934	2887	2840	2794	2748	2703	2658	2614	2570	2527	2484
37	2981	2933	2886	2839	2793	2747	2702	2657	2613	2569	2526	2483
38	2980	2932	2885	2838	2792	2747	2701	2657	2612	2569	2525	2482
39	2979	2931	2884	2838	2792	2746	2701	2656	2612	2568	2525	2482
40	2978	2931	2883	2837	2791	2745	2700	2655	2611	2567	2524	2481
41	2977	2930	2883	2836	2790	2744	2699	2655	2610	2566	2523	2480
42	2977	2929	2882	2835	2789	2744	2698	2654	2610	2566	2522	2480
43	2976	2928	2881	2835	2788	2743	2698	2653	2609	2565	2522	2479
44	2975	2927	2880	2834	2788	2742	2697	2652	2608	2564	2521	2478
45	2974	2927	2880	2833	2787	2741	2696	2652	2607	2564	2520	2477
46	2973	2926	2879	2832	2786	2741	2695	2651	2607	2563	2520	2477
47	2973	2925	2878	2831	2785	2740	2695	2650	2606	2562	2519	2476
48	2972	2924	2877	2831	2785	2739	2694	2649	2605	2561	2518	2475
49	2971	2924	2876	2830	2784	2738	2693	2649	2604	2561	2517	2475
50	2970	2923	2876	2829	2783	2738	2692	2648	2604	2560	2517	2474
51	2969	2922	2875	2828	2782	2737	2692	2647	2603	2559	2516	2473
52	2969	2921	2874	2828	2782	2736	2691	2646	2602	2559	2515	2472
53	2968	2920	2873	2827	2781	2735	2690	2646	2601	2558	2515	2472
54	2967	2920	2873	2826	2780	2735	2689	2645	2601	2557	2514	2471
55	2966	2919	2872	2825	2779	2734	2689	2644	2600	2556	2513	2470
56	2965	2918	2871	2825	2779	2733	2688	2643	2599	2556	2512	2470
57	2965	2917	2870	2824	2778	2732	2687	2643	2599	2555	2512	2469
58	2964	2916	2869	2823	2777	2732	2687	2642	2598	2554	2511	2468
59	2963	2916	2869	2822	2776	2731	2686	2641	2597	2553	2510	2467
60	2962	2915	2868	2821	2775	2730	2685	2640	2596	2553	2510	2467

Sec.	h. m. 1° 42′	h. m. 1° 43′	h. m. 1° 44′	h. m. 1° 45′	h. m 1° 46′	h. m. 1° 47′	h. m. 1° 48′	h. m. 1° 49′	h. m. 1° 50′	h. m. 1° 51′	h. m. 1° 52′	h. m. 1° 53′
0	2467	2424	2382	2341	2300	2259	2218	2178	2139	2099	2061	2022
1	2466	2424	2382	2340	2299	2258	2218	2178	2138	2099	2060	2021
2	2465	2423	2381	2339	2298	2258	2217	2177	2137	2098	2059	2021
3	2465	2422	2380	2339	2298	2257	2216	2176	2137	2098	2059	2020
4	2464	2422	2380	2338	2297	2256	2216	2176	2136	2097	2058	2019
5	2463	2421	2379	2337	2296	2256	2215	2175	2136	2096	2057	2019
6	2462	2420	2378	2337	2296	2255	2214	2174	2135	2096	2057	2018
7	2462	2419	2378	2336	2295	2254	2214	2174	2134	2095	2056	2017
8	2461	2419	2377	2335	2294	2253	2213	2173	2134	2094	2055	2017
9	2460	2418	2376	2335	2294	2253	2212	2172	2133	2094	2055	2016
10	2460	2417	2375	2334	2293	2252	2212	2172	2132	2093	2054	2016
11	2459	2417	2375	2333	2292	2251	2211	2171	2132	2092	2053	2015
12	2458	2416	2374	2333	2291	2251	2210	2170	2131	2092	2053	2014
13	2458	2415	2373	2332	2291	2250	2210	2170	2130	2091	2052	2014
14	2457	2415	2373	2331	2290	2249	2209	2169	2130	2090	2052	2013
15	2456	2414	2372	2331	2289	2249	2208	2169	2129	2090	2051	2012
16	2455	2413	2371	2330	2289	2248	2208	2168	2128	2089	2050	2012
17	2455	2412	2371	2329	2288	2247	2207	2167	2128	2088	2050	2011
18	2454	2412	2370	2328	2287	2247	2206	2167	2127	2088	2049	2010
19	2453	2411	2369	2328	2287	2246	2206	2166	2126	2087	2048	2010
20	2453	2410	2368	2327	2286	2245	2205	2165	2126	2086	2048	2009
21	2452	2410	2368	2326	2285	2245	2204	2165	2125	2086	2047	2009
22	2451	2409	2367	2326	2285	2244	2204	2164	2124	2085	2046	2008
23	2450	2408	2366	2325	2284	2243	2203	2163	2124	2085	2046	2007
24	2450	2408	2366	2324	2283	2243	2202	2163	2123	2084	2045	2007
25	2449	2407	2365	2324	2283	2242	2202	2162	2122	2083	2044	2006
26	2448	2406	2364	2323	2282	2241	2201	2161	2122	2083	2044	2005
27	2448	2405	2364	2322	2281	2241	2200	2161	2121	2082	2043	2005
28	2447	2405	2363	2322	2281	2240	2200	2160	2120	2081	2042	2004
29	2446	2404	2362	2321	2280	2239	2199	2159	2120	2081	2042	2003
30	2445	2403	2362	2320	2279	2239	2198	2159	2119	2080	2041	2003
31	2445	2403	2361	2320	2279	2238	2198	2158	2118	2079	2041	2002
32	2444	2402	2360	2319	2278	2237	2197	2157	2118	2079	2040	2001
33	2443	2401	2359	2318	2277	2237	2196	2157	2117	2078	2039	2001
34	2443	2401	2359	2317	2277	2236	2196	2156	2116	2077	2039	2000
35	2442	2400	2358	2317	2276	2235	2195	2155	2116	2077	2038	2000
36	2441	2399	2357	2316	2275	2235	2194	2155	2115	2076	2037	1999
37	2441	2398	2357	2315	2274	2234	2194	2154	2115	2075	2037	1998
38	2440	2398	2356	2315	2274	2233	2193	2153	2114	2075	2036	1998
39	2439	2397	2355	2314	2273	2233	2192	2153	2113	2074	2035	1997
40	2438	2396	2355	2313	2272	2232	2192	2152	2113	2073	2035	1996
41	2438	2396	2354	2313	2272	2231	2191	2151	2112	2073	2034	1996
42	2437	2395	2353	2312	2271	2231	2190	2151	2111	2072	2033	1995
43	2436	2394	2353	2311	2270	2230	2190	2150	2111	2072	2033	1994
44	2436	2394	2352	2311	2270	2229	2189	2149	2110	2071	2032	1994
45	2435	2393	2351	2310	2269	2229	2188	2149	2109	2070	2032	1993
46	2434	2392	2350	2309	2268	2228	2188	2148	2109	2070	2031	1993
47	2433	2391	2350	2309	2268	2227	2187	2147	2108	2069	2030	1992
48	2433	2391	2349	2308	2267	2227	2186	2147	2107	2068	2030	1991
49	2432	2390	2348	2307	2266	2226	2186	2146	2107	2068	2029	1991
50	2431	2389	2348	2307	2266	2225	2185	2145	2106	2067	2028	1990
51	2431	2389	2347	2306	2265	2225	2184	2145	2105	2066	2028	1989
52	2430	2388	2346	2305	2264	2224	2184	2144	2105	2066	2027	1989
53	2429	2387	2346	2304	2264	2223	2183	2143	2104	2065	2026	1988
54	2429	2387	2345	2304	2263	2223	2182	2143	2103	2064	2026	1987
55	2428	2386	2344	2303	2262	2222	2182	2142	2103	2064	2025	1987
56	2427	2385	2344	2302	2262	2221	2181	2141	2102	2063	2025	1986
57	2426	2384	2343	2302	2261	2220	2180	2141	2101	2062	2024	1986
58	2426	2384	2342	2301	2260	2220	2180	2140	2101	2062	2023	1985
59	2425	2383	2342	2300	2260	2219	2179	2139	2100	2061	2023	1984
60	2424	2382	2341	2300	2259	2218	2178	2139	2099	2061	2022	1984

Sec.	h. m. 1° 54′	h. m. 1° 55′	h. m. 1° 56′	h. m. 1° 57′	h. m. 1° 58′	h. m. 1° 59′	h. m. 2° 0′	h. m. 2° 1′	h. m. 2° 2′	h. m. 2° 3′	h. m. 2° 4′
0	1984	1946	1908	1871	1834	1797	1761	1725	1689	1654	1619
1	1983	1945	1908	1870	1833	1797	1760	1724	1689	1653	1618
2	1982	1944	1907	1870	1833	1796	1760	1724	1688	1652	1617
3	1982	1944	1906	1869	1832	1795	1759	1723	1687	1652	1617
4	1981	1943	1906	1868	1831	1795	1759	1722	1687	1651	1616
5	1981	1943	1905	1868	1831	1794	1758	1722	1686	1651	1616
6	1980	1942	1904	1867	1830	1794	1757	1721	1686	1650	1615
7	1979	1941	1904	1867	1830	1793	1757	1721	1685	1650	1614
8	1979	1941	1903	1866	1829	1792	1756	1720	1684	1649	1614
9	1978	1940	1903	1865	1828	1792	1755	1719	1684	1648	1613
10	1977	1939	1902	1865	1828	1791	1755	1719	1683	1648	1613
11	1977	1939	1901	1864	1827	1791	1754	1718	1683	1647	1612
12	1976	1938	1901	1863	1827	1790	1754	1718	1682	1647	1612
13	1975	1938	1900	1863	1826	1789	1753	1717	1681	1646	1611
14	1975	1937	1899	1862	1825	1789	1752	1717	1681	1645	1610
15	1974	1936	1899	1862	1825	1788	1752	1716	1680	1645	1610
16	1974	1936	1898	1861	1824	1788	1751	1715	1680	1644	1609
17	1973	1935	1898	1860	1823	1787	1751	1715	1679	1644	1609
18	1972	1934	1897	1860	1823	1786	1750	1714	1678	1643	1608
19	1972	1934	1896	1859	1822	1786	1749	1714	1678	1643	1607
20	1971	1933	1896	1859	1822	1785	1749	1713	1677	1642	1607
21	1970	1933	1895	1858	1821	1785	1748	1712	1677	1641	1606
22	1970	1932	1894	1857	1820	1784	1748	1712	1676	1641	1606
23	1969	1931	1894	1857	1820	1783	1747	1711	1676	1640	1605
24	1968	1931	1893	1856	1819	1783	1746	1711	1675	1640	1605
25	1968	1930	1893	1855	1819	1782	1746	1710	1674	1639	1604
26	1967	1929	1892	1855	1818	1781	1745	1709	1674	1638	1603
27	1967	1929	1891	1854	1817	1781	1745	1709	1673	1638	1603
28	1966	1928	1891	1854	1817	1780	1744	1708	1673	1637	1602
29	1965	1928	1890	1853	1816	1780	1743	1708	1672	1637	1602
30	1965	1927	1889	1852	1816	1779	1743	1707	1671	1636	1601
31	1964	1926	1889	1852	1815	1778	1742	1706	1671	1635	1600
32	1963	1926	1888	1851	1814	1778	1742	1706	1670	1635	1600
33	1963	1925	1888	1850	1814	1777	1741	1705	1670	1634	1599
34	1962	1924	1887	1850	1813	1777	1740	1705	1669	1634	1599
35	1962	1924	1886	1849	1812	1776	1740	1704	1668	1633	1598
36	1961	1923	1886	1849	1812	1775	1739	1703	1668	1633	1598
37	1960	1923	1885	1848	1811	1775	1739	1703	1667	1632	1597
38	1960	1922	1884	1847	1811	1774	1738	1702	1667	1631	1596
39	1959	1921	1884	1847	1810	1774	1737	1702	1666	1631	1596
40	1958	1921	1883	1846	1809	1773	1737	1701	1665	1630	1595
41	1958	1920	1883	1846	1809	1772	1736	1700	1665	1630	1595
42	1957	1919	1882	1845	1808	1772	1736	1700	1664	1629	1594
43	1956	1919	1881	1844	1808	1771	1735	1699	1664	1628	1593
44	1956	1918	1881	1844	1807	1771	1734	1699	1663	1628	1593
45	1955	1918	1880	1843	1806	1770	1734	1698	1663	1627	1592
46	1955	1917	1880	1843	1806	1769	1733	1697	1662	1627	1592
47	1954	1916	1879	1842	1805	1769	1733	1697	1661	1626	1591
48	1953	1916	1878	1841	1805	1768	1732	1696	1661	1626	1591
49	1953	1915	1878	1841	1804	1768	1731	1696	1660	1625	1590
50	1952	1914	1877	1840	1803	1767	1731	1695	1660	1624	1589
51	1951	1914	1876	1839	1803	1766	1730	1694	1659	1624	1589
52	1951	1913	1876	1839	1802	1766	1730	1694	1658	1623	1588
53	1950	1913	1875	1838	1802	1765	1729	1693	1658	1623	1588
54	1950	1912	1875	1838	1801	1765	1728	1693	1657	1622	1587
55	1949	1911	1874	1837	1800	1764	1728	1692	1657	1621	1587
56	1948	1911	1873	1836	1800	1763	1727	1692	1656	1621	1586
57	1948	1910	1873	1836	1799	1763	1727	1691	1655	1620	1585
58	1947	1909	1872	1835	1798	1762	1726	1690	1655	1620	1585
59	1946	1909	1871	1835	1798	1762	1725	1690	1654	1619	1584
60	1946	1908	1871	1834	1797	1761	1725	1689	1654	1619	1584

Sec.	h. m. 2° 5′	h. m. 2° 6′	h. m. 2° 7′	h. m. 2° 8′	h. m. 2° 9′	h. m. 2° 10′	h. m. 2° 11′	h. m. 2° 12′	h. m. 2° 13′	h. m. 2° 14′	h. m. 2° 15′
0	1584	1549	1515	1481	1447	1413	1380	1347	1314	1282	1249
1	1583	1548	1514	1480	1446	1413	1379	1346	1314	1281	1249
2	1582	1548	1514	1479	1446	1412	1379	1346	1313	1281	1248
3	1582	1547	1513	1479	1445	1412	1378	1345	1313	1280	1248
4	1581	1547	1512	1478	1445	1411	1378	1345	1312	1280	1247
5	1581	1546	1512	1478	1444	1411	1377	1344	1311	1279	1247
6	1580	1546	1511	1477	1443	1410	1377	1344	1311	1278	1246
7	1580	1545	1511	1477	1443	1409	1376	1343	1310	1278	1246
8	1579	1544	1510	1476	1442	1409	1376	1343	1310	1277	1245
9	1578	1544	1510	1476	1442	1408	1375	1342	1309	1277	1245
10	1578	1543	1509	1475	1441	1408	1374	1342	1309	1276	1244
11	1577	1543	1508	1474	1441	1407	1374	1341	1308	1276	1243
12	1577	1542	1508	1474	1440	1407	1373	1340	1308	1275	1243
13	1576	1542	1507	1473	1440	1406	1373	1340	1307	1275	1242
14	1576	1541	1507	1473	1439	1406	1372	1339	1307	1274	1242
15	1575	1540	1506	1472	1438	1405	1372	1339	1306	1274	1241
16	1574	1540	1506	1472	1438	1404	1371	1338	1306	1273	1241
17	1574	1539	1505	1471	1437	1404	1371	1338	1305	1273	1240
18	1573	1539	1504	1470	1437	1403	1370	1337	1304	1272	1240
19	1573	1538	1504	1470	1436	1403	1370	1337	1304	1271	1239
20	1572	1538	1503	1469	1436	1402	1369	1336	1303	1271	1239
21	1571	1537	1503	1469	1435	1402	1368	1335	1303	1270	1238
22	1571	1536	1502	1468	1435	1401	1368	1335	1302	1270	1238
23	1570	1536	1502	1468	1434	1401	1367	1334	1302	1269	1237
24	1570	1535	1501	1467	1433	1400	1367	1334	1301	1269	1237
25	1569	1535	1500	1467	1433	1399	1366	1333	1301	1268	1236
26	1569	1534	1500	1466	1432	1399	1366	1333	1300	1268	1235
27	1568	1534	1499	1465	1432	1398	1365	1332	1300	1267	1235
28	1567	1533	1499	1465	1431	1398	1365	1332	1299	1267	1234
29	1567	1532	1498	1464	1431	1397	1364	1331	1298	1266	1234
30	1566	1532	1498	1464	1430	1397	1363	1331	1298	1266	1233
31	1566	1531	1497	1463	1429	1396	1363	1330	1297	1265	1233
32	1565	1531	1496	1463	1429	1396	1362	1329	1297	1264	1232
33	1565	1530	1496	1462	1428	1395	1362	1329	1296	1264	1232
34	1564	1530	1495	1461	1428	1394	1361	1328	1296	1263	1231
35	1563	1529	1495	1461	1427	1394	1361	1328	1295	1263	1231
36	1563	1528	1494	1460	1427	1393	1360	1327	1295	1262	1230
37	1562	1528	1494	1460	1426	1393	1360	1327	1294	1262	1230
38	1562	1527	1493	1459	1426	1392	1359	1326	1294	1261	1229
39	1561	1527	1493	1459	1425	1392	1359	1326	1293	1261	1229
40	1561	1526	1492	1458	1424	1391	1358	1325	1292	1260	1228
41	1560	1526	1491	1458	1424	1391	1357	1325	1292	1260	1227
42	1559	1525	1491	1457	1423	1390	1357	1324	1291	1259	1227
43	1559	1524	1490	1456	1423	1389	1356	1323	1291	1259	1226
44	1558	1524	1490	1456	1422	1389	1356	1323	1290	1258	1226
45	1558	1523	1489	1455	1422	1388	1355	1322	1290	1257	1225
46	1557	1523	1489	1455	1421	1388	1355	1322	1289	1257	1225
47	1556	1522	1488	1454	1421	1387	1354	1321	1289	1256	1224
48	1556	1522	1487	1454	1420	1387	1354	1321	1288	1256	1224
49	1555	1521	1487	1453	1419	1386	1353	1320	1288	1255	1223
50	1555	1520	1486	1452	1419	1386	1352	1320	1287	1255	1223
51	1554	1520	1486	1452	1418	1385	1352	1319	1287	1254	1222
52	1554	1519	1485	1451	1418	1384	1351	1319	1286	1254	1222
53	1553	1519	1485	1451	1417	1384	1351	1318	1285	1253	1221
54	1552	1518	1484	1450	1417	1383	1350	1317	1285	1253	1221
55	1552	1518	1483	1450	1416	1383	1350	1317	1284	1252	1220
56	1551	1517	1483	1449	1416	1382	1349	1316	1284	1252	1219
57	1551	1516	1482	1449	1415	1382	1349	1316	1283	1251	1219
58	1550	1516	1482	1448	1414	1381	1348	1315	1283	1250	1218
59	1550	1515	1481	1447	1414	1381	1348	1315	1282	1250	1218
60	1549	1515	1481	1447	1413	1380	1347	1314	1282	1249	1217

Sec.	h. m. 2° 16′	h. m. 2° 17′	h. m. 2° 18′	h. m. 2° 19′	h. m. 2° 20′	h. m. 2° 21′	h. m. 2° 22′	h. m. 2° 23′	h. m. 2° 24′	h. m. 2° 25′	h. m. 2° 26′
0	1217	1186	1154	1123	1091	1061	1030	0999	0969	0939	0909
1	1217	1185	1153	1122	1091	1060	1029	0999	0969	0939	0909
2	1216	1184	1153	1122	1090	1060	1029	0998	0968	0938	0908
3	1216	1184	1152	1121	1090	1059	1028	0998	0968	0938	0908
4	1215	1183	1152	1120	1089	1058	1028	0997	0967	0937	0907
5	1215	1183	1151	1120	1089	1058	1027	0997	0967	0937	0907
6	1214	1182	1151	1119	1088	1057	1027	0996	0966	0936	0906
7	1214	1182	1150	1119	1088	1057	1026	0996	0966	0936	0906
8	1213	1181	1150	1118	1087	1056	1026	0995	0965	0935	0905
9	1213	1181	1149	1118	1087	1056	1025	0995	0965	0935	0905
10	1212	1180	1149	1117	1086	1055	1025	0994	0964	0934	0904
11	1211	1180	1148	1117	1086	1055	1024	0994	0964	0934	0904
12	1211	1179	1148	1116	1085	1054	1024	0993	0963	0933	0903
13	1210	1179	1147	1116	1085	1054	1023	0993	0963	0933	0903
14	1210	1178	1147	1115	1084	1053	1023	0992	0962	0932	0902
15	1209	1178	1146	1115	1084	1053	1022	0992	0962	0932	0902
16	1209	1177	1146	1114	1083	1052	1022	0991	0961	0931	0901
17	1208	1177	1145	1114	1083	1052	1021	0991	0961	0931	0901
18	1208	1176	1145	1113	1082	1051	1021	0990	0960	0930	0900
19	1207	1175	1144	1113	1082	1051	1020	0990	0960	0930	0900
20	1207	1175	1143	1112	1081	1050	1020	0989	0959	0929	0899
21	1206	1174	1143	1112	1081	1050	1019	0989	0959	0929	0899
22	1206	1174	1142	1111	1080	1049	1019	0988	0958	0928	0898
23	1205	1173	1142	1111	1080	1049	1018	0988	0958	0928	0898
24	1205	1173	1141	1110	1079	1048	1018	0987	0957	0927	0897
25	1204	1172	1141	1110	1079	1048	1017	0987	0957	0927	0897
26	1204	1172	1140	1109	1078	1047	1017	0986	0956	0926	0896
27	1203	1171	1140	1109	1078	1047	1016	0986	0956	0926	0896
28	1202	1171	1139	1108	1077	1046	1016	0985	0955	0925	0895
29	1202	1170	1139	1108	1076	1046	1015	0985	0955	0925	0895
30	1201	1170	1138	1107	1076	1045	1015	0984	0954	0924	0894
31	1201	1169	1138	1106	1075	1045	1014	0984	0954	0924	0894
32	1200	1169	1137	1106	1075	1044	1014	0983	0953	0923	0893
33	1200	1168	1137	1105	1074	1044	1013	0983	0953	0923	0893
34	1199	1168	1136	1105	1074	1043	1013	0982	0952	0922	0892
35	1199	1167	1136	1104	1073	1043	1012	0982	0952	0922	0892
36	1198	1167	1135	1104	1073	1042	1012	0981	0951	0921	0891
37	1198	1166	1135	1103	1072	1042	1011	0981	0951	0921	0891
38	1197	1165	1134	1103	1072	1041	1011	0980	0950	0920	0890
39	1197	1165	1134	1102	1071	1041	1010	0980	0950	0920	0890
40	1196	1164	1133	1102	1071	1040	1009	0979	0949	0919	0889
41	1196	1164	1132	1101	1070	1040	1009	0979	0949	0919	0889
42	1195	1163	1132	1101	1070	1039	1008	0978	0948	0918	0888
43	1195	1163	1131	1100	1069	1039	1008	0978	0948	0918	0888
44	1194	1162	1131	1100	1069	1038	1007	0977	0947	0917	0887
45	1193	1162	1130	1099	1068	1037	1007	0977	0947	0917	0887
46	1193	1161	1130	1099	1068	1037	1006	0976	0946	0916	0886
47	1192	1161	1129	1098	1067	1036	1006	0976	0946	0916	0886
48	1192	1160	1129	1098	1067	1036	1005	0975	0945	0915	0885
49	1191	1160	1128	1097	1066	1035	1005	0975	0945	0915	0885
50	1191	1159	1128	1097	1066	1035	1004	0974	0944	0914	0884
51	1190	1159	1127	1096	1065	1034	1004	0974	0944	0914	0884
52	1190	1158	1127	1096	1065	1034	1003	0973	0943	0913	0883
53	1189	1158	1126	1095	1064	1033	1003	0973	0943	0913	0883
54	1189	1157	1126	1095	1064	1033	1002	0972	0942	0912	0883
55	1188	1157	1125	1094	1063	1032	1002	0972	0942	0912	0882
56	1188	1156	1125	1094	1063	1032	1001	0971	0941	0911	0882
57	1187	1156	1124	1093	1062	1031	1001	0971	0941	0911	0881
58	1187	1155	1124	1092	1062	1031	1000	0970	0940	0910	0881
59	1186	1154	1123	1092	1061	1030	1000	0970	0940	0910	0880
60	1186	1154	1123	1091	1061	1030	0999	0969	0939	0909	0880

Sec.	h. m. 2° 27′	h. m. 2° 28′	h. m. 2° 29′	h. m. 2° 30′	h. m. 2° 31′	h. m. 2° 32′	h. m. 2° 33′	h. m. 2° 34′	h. m. 2° 35′	h. m. 2° 36′	h. m. 2° 37′
0	0880	0850	0821	0792	0763	0734	0706	0678	0649	0621	0594
1	0879	0850	0820	0791	0762	0734	0705	0677	0649	0621	0593
2	0879	0849	0820	0791	0762	0733	0705	0677	0648	0621	0593
3	0878	0849	0819	0790	0762	0733	0704	0676	0648	0620	0592
4	0878	0848	0819	0790	0761	0732	0704	0676	0648	0620	0592
5	0877	0848	0818	0789	0761	0732	0703	0675	0647	0619	0591
6	0877	0847	0818	0789	0760	0731	0703	0675	0647	0619	0591
7	0876	0847	0817	0788	0760	0731	0703	0674	0646	0618	0591
8	0876	0846	0817	0788	0759	0730	0702	0674	0646	0618	0590
9	0875	0846	0816	0787	0759	0730	0702	0673	0645	0617	0590
10	0875	0845	0816	0787	0758	0730	0701	0673	0645	0617	0589
11	0874	0845	0816	0787	0758	0729	0701	0672	0644	0616	0589
12	0874	0844	0815	0786	0757	0729	0700	0672	0644	0616	0588
13	0873	0844	0815	0786	0757	0728	0700	0671	0643	0615	0588
14	0873	0843	0814	0785	0756	0728	0699	0671	0643	0615	0587
15	0872	0843	0814	0785	0756	0727	0699	0670	0642	0615	0587
16	0872	0842	0813	0784	0755	0727	0698	0670	0642	0614	0586
17	0871	0842	0813	0784	0755	0726	0698	0670	0641	0614	0586
18	0871	0841	0812	0783	0754	0726	0697	0669	0641	0613	0585
19	0870	0841	0812	0783	0754	0725	0697	0669	0641	0613	0585
20	0870	0840	0811	0782	0753	0725	0696	0668	0640	0612	0585
21	0869	0840	0811	0782	0753	0724	0696	0668	0640	0612	0584
22	0869	0839	0810	0781	0752	0724	0695	0667	0639	0611	0584
23	0868	0839	0810	0781	0752	0723	0695	0667	0639	0611	0583
24	0868	0838	0809	0780	0751	0723	0694	0666	0638	0610	0583
25	0867	0838	0809	0780	0751	0722	0694	0666	0638	0610	0582
26	0867	0837	0808	0779	0751	0722	0694	0665	0637	0609	0582
27	0866	0837	0808	0779	0750	0721	0693	0665	0637	0609	0581
28	0866	0836	0807	0778	0750	0721	0693	0664	0636	0609	0581
29	0865	0836	0807	0778	0749	0721	0692	0664	0636	0608	0580
30	0865	0835	0806	0777	0749	0720	0692	0663	0635	0608	0580
31	0864	0835	0806	0777	0748	0720	0691	0663	0635	0607	0579
32	0864	0834	0805	0776	0748	0719	0691	0663	0634	0607	0579
33	0863	0834	0805	0776	0747	0719	0690	0662	0634	0606	0579
34	0863	0834	0804	0775	0747	0718	0690	0662	0634	0606	0578
35	0862	0833	0804	0775	0746	0718	0689	0661	0633	0605	0578
36	0862	0833	0803	0774	0746	0717	0689	0661	0633	0605	0577
37	0861	0832	0803	0774	0745	0717	0688	0660	0632	0604	0577
38	0861	0832	0802	0774	0745	0716	0688	0660	0632	0604	0576
39	0860	0831	0802	0773	0744	0716	0687	0659	0631	0603	0576
40	0860	0831	0801	0773	0744	0715	0687	0659	0631	0603	0575
41	0859	0830	0801	0772	0743	0715	0686	0658	0630	0602	0575
42	0859	0830	0801	0772	0743	0714	0686	0658	0630	0602	0574
43	0858	0829	0800	0771	0742	0714	0686	0657	0629	0602	0574
44	0858	0829	0800	0771	0742	0713	0685	0657	0629	0601	0573
45	0857	0828	0799	0770	0741	0713	0685	0656	0628	0601	0573
46	0857	0828	0799	0770	0741	0712	0684	0656	0628	0600	0573
47	0856	0827	0798	0769	0740	0712	0684	0655	0628	0600	0572
48	0856	0827	0798	0769	0740	0711	0683	0655	0627	0599	0572
49	0855	0826	0797	0768	0740	0711	0683	0655	0627	0599	0571
50	0855	0826	0797	0768	0739	0711	0682	0654	0626	0598	0571
51	0855	0825	0796	0767	0739	0710	0682	0654	0626	0598	0570
52	0854	0825	0796	0767	0738	0710	0681	0653	0625	0597	0570
53	0854	0824	0795	0766	0738	0709	0681	0653	0625	0597	0569
54	0853	0824	0795	0766	0737	0709	0680	0652	0624	0596	0569
55	0853	0823	0794	0765	0737	0708	0680	0652	0624	0596	0568
56	0852	0823	0794	0765	0736	0708	0679	0651	0623	0596	0568
57	0852	0822	0793	0764	0736	0707	0679	0651	0623	0595	0568
58	0851	0822	0793	0764	0735	0707	0678	0650	0622	0595	0567
59	0851	0821	0792	0763	0735	0706	0678	0650	0622	0594	0567
60	0850	0821	0792	0763	0734	0706	0678	0649	0621	0594	0566

Sec.	h. m. 2° 38′	h. m. 2° 39′	h. m. 2° 40′	h. m. 2° 41′	h. m. 2° 42′	h. m. 2° 43′	h. m. 2° 44′	h. m. 2° 45′	h. m. 2° 46′	h. m. 2° 47′	h. m. 2° 48′
0	0566	0539	0512	0484	0458	0431	0404	0378	0352	0326	0300
1	0566	0538	0511	0484	0457	0430	0404	0377	0351	0325	0299
2	0565	0538	0511	0484	0457	0430	0403	0377	0351	0325	0299
3	0565	0537	0510	0483	0456	0430	0403	0377	0350	0324	0298
4	0564	0537	0510	0483	0456	0429	0403	0376	0350	0324	0298
5	0564	0536	0509	0482	0455	0429	0402	0376	0349	0323	0297
6	0563	0536	0509	0482	0455	0428	0402	0375	0349	0323	0297
7	0563	0536	0508	0481	0454	0428	0401	0375	0349	0323	0297
8	0562	0535	0508	0481	0454	0427	0401	0374	0348	0322	0296
9	0562	0535	0507	0480	0454	0427	0400	0374	0348	0322	0296
10	0562	0534	0507	0480	0453	0426	0400	0374	0347	0321	0295
11	0561	0534	0507	0480	0453	0426	0399	0373	0347	0321	0295
12	0561	0533	0506	0479	0452	0426	0399	0373	0346	0320	0294
13	0560	0533	0506	0479	0452	0425	0399	0372	0346	0320	0294
14	0560	0532	0505	0478	0451	0425	0398	0372	0346	0319	0294
15	0559	0532	0505	0478	0451	0424	0398	0371	0345	0319	0293
16	0559	0531	0504	0477	0450	0424	0397	0371	0345	0319	0293
17	0558	0531	0504	0477	0450	0423	0397	0370	0344	0318	0292
18	0558	0531	0503	0476	0450	0423	0396	0370	0344	0318	0292
19	0557	0530	0503	0476	0449	0422	0396	0370	0343	0317	0291
20	0557	0530	0502	0475	0449	0422	0395	0369	0343	0317	0291
21	0557	0529	0502	0475	0448	0422	0395	0369	0342	0316	0291
22	0556	0529	0502	0475	0448	0421	0395	0368	0342	0316	0290
23	0556	0528	0501	0474	0447	0421	0394	0368	0342	0316	0290
24	0555	0528	0501	0474	0447	0420	0394	0367	0341	0315	0289
25	0555	0527	0500	0473	0446	0420	0393	0367	0341	0315	0289
26	0554	0527	0500	0473	0446	0419	0393	0366	0340	0314	0288
27	0554	0526	0499	0472	0446	0419	0392	0366	0340	0314	0288
28	0553	0526	0499	0472	0445	0418	0392	0366	0339	0313	0288
29	0553	0526	0498	0471	0445	0418	0392	0365	0339	0313	0287
30	0552	0525	0498	0471	0444	0418	0391	0365	0339	0313	0287
31	0552	0525	0498	0471	0444	0417	0391	0364	0338	0312	0286
32	0552	0524	0497	0470	0443	0417	0390	0364	0338	0312	0286
33	0551	0524	0497	0470	0443	0416	0390	0363	0337	0311	0285
34	0551	0523	0496	0469	0442	0416	0389	0363	0337	0311	0285
35	0550	0523	0496	0469	0442	0415	0389	0363	0336	0310	0285
36	0550	0522	0495	0468	0442	0415	0388	0362	0336	0310	0284
37	0549	0522	0495	0468	0441	0414	0388	0362	0336	0310	0284
38	0549	0521	0494	0467	0441	0414	0388	0361	0335	0309	0283
39	0548	0521	0494	0467	0440	0414	0387	0361	0335	0309	0283
40	0548	0521	0493	0466	0440	0413	0387	0360	0334	0308	0282
41	0547	0520	0493	0466	0439	0413	0386	0360	0334	0308	0282
42	0547	0520	0493	0466	0439	0412	0386	0359	0333	0307	0282
43	0546	0519	0492	0465	0438	0412	0385	0359	0333	0307	0281
44	0546	0519	0492	0465	0438	0411	0385	0359	0333	0307	0281
45	0546	0518	0491	0464	0438	0411	0384	0358	0332	0306	0280
46	0545	0518	0491	0464	0437	0410	0384	0358	0332	0306	0280
47	0545	0517	0490	0463	0437	0410	0384	0357	0331	0305	0279
48	0544	0517	0490	0463	0436	0410	0383	0357	0331	0305	0279
49	0544	0517	0489	0462	0436	0409	0383	0356	0330	0304	0279
50	0543	0516	0489	0462	0435	0409	0382	0356	0330	0304	0278
51	0543	0516	0489	0462	0435	0408	0382	0356	0329	0304	0278
52	0542	0515	0488	0461	0434	0408	0381	0355	0329	0303	0277
53	0542	0515	0488	0461	0434	0407	0381	0355	0329	0303	0277
54	0541	0514	0487	0460	0434	0407	0381	0354	0328	0302	0276
55	0541	0514	0487	0460	0433	0406	0380	0354	0328	0302	0276
56	0541	0513	0486	0459	0433	0406	0380	0353	0327	0301	0276
57	0540	0513	0486	0459	0432	0406	0379	0353	0327	0301	0275
58	0540	0512	0485	0458	0432	0405	0379	0353	0326	0300	0275
59	0539	0512	0485	0458	0431	0405	0378	0352	0326	0300	0274
60	0539	0512	0484	0458	0431	0404	0378	0352	0326	0300	0274

Sec.	h. m. 2° 49′	h. m. 2° 50′	h. m. 2° 51′	h. m. 2° 52′	h. m. 2° 53′	h. m. 2° 54′	h. m. 2° 55′	h. m. 2° 56′	h. m. 2° 57′	h. m. 2° 58′	h. m. 2° 59′
0	0274	0248	0223	0197	0172	0147	0122	0098	0073	0049	0024
1	0273	0248	0222	0197	0172	0147	0122	0097	0073	0048	0024
2	0273	0247	0222	0197	0171	0146	0122	0097	0072	0048	0023
3	0273	0247	0221	0196	0171	0146	0121	0096	0072	0047	0023
4	0272	0247	0221	0196	0171	0416	0121	0096	0071	0047	0023
5	0272	0246	0221	0195	0170	0145	0120	0096	0071	0046	0022
6	0271	0246	0220	0195	0170	0145	0120	0095	0071	0046	0022
7	0271	0245	0220	0194	0169	0144	0119	0095	0070	0046	0021
8	0270	0245	0219	0194	0169	0144	0119	0094	0070	0045	0021
9	0270	0244	0219	0194	0169	0143	0119	0094	0069	0045	0021
10	0270	0244	0219	0193	0168	0143	0118	0093	0069	0044	0020
11	0269	0244	0218	0193	0168	0143	0118	0093	0068	0044	0020
12	0269	0243	0218	0192	0167	0142	0117	0093	0068	0044	0019
13	0268	0243	0217	0192	0167	0142	0117	0092	0068	0043	0019
14	0268	0242	0217	0192	0166	0141	0117	0092	0067	0043	0019
15	0267	0242	0216	0191	0166	0141	0116	0091	0067	0042	0018
16	0267	0241	0216	0191	0166	0141	0116	0091	0066	0042	0018
17	0267	0241	0216	0190	0165	0140	0115	0091	0066	0042	0017
18	0266	0241	0215	0190	0165	0140	0115	0090	0066	0041	0017
19	0266	0240	0215	0189	0164	0139	0114	0090	0065	0041	0017
20	0265	0240	0214	0189	0164	0139	0114	0089	0065	0040	0016
21	0265	0239	0214	0189	0163	0139	0114	0089	0064	0040	0016
22	0264	0239	0213	0188	0163	0138	0113	0089	0064	0040	0015
23	0264	0238	0213	0188	0163	0138	0113	0088	0064	0039	0015
24	0264	0238	0213	0187	0162	0137	0112	0088	0063	0039	0015
25	0263	0238	0212	0187	0162	0137	0112	0087	0063	0038	0014
26	0263	0237	0212	0187	0161	0136	0112	0087	0062	0038	0014
27	0262	0237	0211	0186	0161	0136	0111	0087	0062	0038	0013
28	0262	0236	0211	0186	0161	0136	0111	0086	0062	0037	0013
29	0261	0236	0211	0185	0160	0135	0110	0086	0061	0037	0012
30	0261	0235	0210	0185	0160	0135	0110	0085	0061	0036	0012
31	0261	0235	0210	0184	0159	0134	0110	0085	0060	0036	0012
32	0260	0235	0209	0184	0159	0134	0109	0084	0060	0036	0011
33	0260	0234	0209	0184	0158	0134	0109	0084	0060	0035	0011
34	0259	0234	0208	0183	0158	0133	0108	0084	0059	0035	0010
35	0259	0233	0208	0183	0158	0133	0108	0083	0059	0034	0010
36	0258	0233	0208	0182	0157	0132	0107	0083	0058	0034	0010
37	0258	0233	0207	0182	0157	0132	0107	0082	0058	0034	0009
38	0258	0232	0207	0181	0156	0131	0107	0082	0057	0033	0009
39	0257	0232	0206	0181	0156	0131	0106	0082	0057	0033	0008
40	0257	0231	0206	0181	0156	0131	0106	0081	0057	0032	0008
41	0256	0231	0205	0180	0155	0130	0105	0081	0056	0032	0008
42	0256	0230	0205	0180	0155	0130	0105	0080	0056	0031	0007
43	0255	0230	0205	0179	0154	0129	0105	0080	0055	0031	0007
44	0255	0230	0204	0179	0154	0129	0104	0080	0055	0031	0006
45	0255	0229	0204	0179	0153	0129	0104	0079	0055	0030	0006
46	0254	0229	0203	0178	0153	0128	0103	0079	0054	0030	0006
47	0254	0228	0203	0178	0153	0128	0103	0078	0054	0029	0005
48	0253	0228	0202	0177	0152	0127	0103	0078	0053	0029	0005
49	0253	0227	0202	0177	0152	0127	0102	0077	0053	0029	0004
50	0252	0227	0202	0176	0151	0126	0102	0077	0053	0028	0004
51	0252	0227	0201	0176	0151	0126	0101	0077	0052	0028	0004
52	0252	0226	0201	0176	0151	0126	0101	0076	0052	0027	0003
53	0251	0226	0200	0175	0150	0125	0100	0076	0051	0027	0003
54	0251	0225	0200	0175	0150	0125	0100	0075	0051	0027	0002
55	0250	0225	0200	0174	0149	0124	0100	0075	0051	0026	0002
56	0250	0224	0199	0174	0149	0124	0099	0075	0050	0026	0002
57	0250	0224	0199	0174	0148	0124	0099	0074	0050	0025	0001
58	0249	0224	0198	0173	0148	0123	0098	0074	0049	0025	0001
59	0249	0223	0198	0173	0148	0123	0098	0073	0049	0025	0000
60	0248	0223	0197	0172	0147	0122	0098	0073	0049	0024	0000

TABLE IX.

LOGARITHMIC SINES, TANGENTS,

AND

SECANTS.

0°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	− ∞	10.00000	10.00000	+ ∞	− ∞	+ ∞	60
1	6.46373	10.00000	10.00000	13.53627	6.46373	13.53627	59
2	6.76476	10.00000	10.00000	13.23524	6.76476	13.23524	58
3	6.94085	10.00000	10.00000	13.05915	6.94085	13.05915	57
4	7.06579	10.00000	10.00000	12.93421	7.06579	12.93421	56
5	7.16270	10.00000	10.00000	12.83730	7.16270	12.83730	55
6	7.24188	10.00000	10.00000	12.75812	7.24188	12.75812	54
7	7.30882	10.00000	10.00000	12.69118	7.30882	12.69118	53
8	7.36682	10.00000	10.00000	12.63318	7.36682	12.63318	52
9	7.41797	10.00000	10.00000	12.58203	7.41797	12.58203	51
10	7.46373	10.00000	10.00000	12.53627	7.46373	12.53627	50
11	7.50512	10.00000	10.00000	12.49488	7.50512	12.49488	49
12	7.54291	10.00000	10.00000	12.45709	7.54291	12.45709	48
13	7.57767	10.00000	10.00000	12.42233	7.57767	12.42233	47
14	7.60985	10.00000	10.00000	12.39015	7.60986	12.39014	46
15	7.63982	10.00000	10.00000	12.36018	7.63982	12.36018	45
16	7.66784	10.00000	10.00000	12.33216	7.66785	12.33215	44
17	7.69417	9.99999	10.00001	12.30583	7.69418	12.30582	43
18	7.71900	9.99999	10.00001	12.28100	7.71900	12.28100	42
19	7.74248	9.99999	10.00001	12.25752	7.74248	12.25752	41
20	7.76475	9.99999	10.00001	12.23525	7.76476	12.23524	40
21	7.78594	9.99999	10.00001	12.21406	7.78595	12.21405	39
22	7.80615	9.99999	10.00001	12.19385	7.80615	12.19385	38
23	7.82545	9.99999	10.00001	12.17455	7.82546	12.17454	37
24	7.84393	9.99999	10.00001	12.15607	7.84394	12.15606	36
25	7.86166	9.99999	10.00001	12.13834	7.86167	12.13833	35
26	7.87870	9.99999	10.00001	12.12130	7.87871	12.12129	34
27	7.89509	9.99999	10.00001	12.10491	7.89510	12.10490	33
28	7.91088	9.99999	10.00001	12.08912	7.91089	12.08911	32
29	7.92612	9.99998	10.00002	12.07388	7.92613	12.07387	31
30	7.94084	9.99998	10.00002	12.05916	7.94086	12.05914	30
31	7.95508	9.99998	10.00002	12.04492	7.95510	12.04490	29
32	7.96887	9.99998	10.00002	12.03113	7.96889	12.03111	28
33	7.98223	9.99998	10.00002	12.01777	7.98225	12.01775	27
34	7.99520	9.99998	10.00002	12.00480	7.99522	12.00478	26
35	8.00779	9.99998	10.00002	11.99221	8.00781	11.99219	25
36	8.02002	9.99998	10.00002	11.97998	8.02004	11.97996	24
37	8.03192	9.99997	10.00003	11.96808	8.03194	11.96806	23
38	8.04350	9.99997	10.00003	11.95650	8.04353	11.95647	22
39	8.05478	9.99997	10.00003	11.94522	8.05481	11.94519	21
40	8.06578	9.99997	10.00003	11.93422	8.06581	11.93419	20
41	8.07650	9.99997	10.00003	11.92350	8.07653	11.92347	19
42	8.08696	9.99997	10.00003	11.91304	8.08700	11.91300	18
43	8.09718	9.99997	10.00003	11.90282	8.09722	11.90278	17
44	8.10717	9.99996	10.00004	11.89283	8.10720	11.89280	16
45	8.11693	9.99996	10.00004	11.88307	8.11696	11.88304	15
46	8.12647	9.99996	10.00004	11.87353	8.12651	11.87349	14
47	8.13581	9.99996	10.00004	11.86419	8.13585	11.86415	13
48	8.14495	9.99996	10.00004	11.85505	8.14500	11.85500	12
49	8.15391	9.99996	10.00004	11.84609	8.15395	11.84605	11
50	8.16268	9.99995	10.00005	11.83732	8.16273	11.83727	10
51	8.17128	9.99995	10.00005	11.82872	8.17133	11.82867	9
52	8.17971	9.99995	10.00005	11.82029	8.17976	11.82024	8
53	8.18798	9.99995	10.00005	11.81202	8.18804	11.81196	7
54	8.19610	9.99995	10.00005	11.80390	8.19616	11.80384	6
55	8.20407	9.99994	10.00006	11.79593	8.20413	11.79587	5
56	8.21189	9.99994	10.00006	11.78811	8.21195	11.78805	4
57	8.21958	9.99994	10.00006	11.78042	8.21964	11.78036	3
58	8.22713	9.99994	10.00006	11.77287	8.22720	11.77280	2
59	8.23456	9.99994	10.00006	11.76544	8.23462	11.76538	1
60	8.24186	9.99993	10.00007	11.75814	8.24192	11.75808	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

89°

1°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	8.24186	9.99993	10.00007	11.75814	8.24192	11.75808	60
1	8.24903	9.99993	10.00007	11.75097	8.24910	11.75090	59
2	8.25609	9.99993	10.00007	11.74391	8.25616	11.74384	58
3	8.26304	9.99993	10.00007	11.73696	8.26312	11.73688	57
4	8.26988	9.99992	10.00008	11.73012	8.26996	11.73004	56
5	8.27661	9.99992	10.00008	11.72339	8.27669	11.72331	55
6	8.28324	9.99992	10.00008	11.71676	8.28332	11.71668	54
7	8.28977	9.99992	10.00008	11.71023	8.28986	11.71014	53
8	8.29621	9.99992	10.00008	11.70379	8.29629	11.70371	52
9	8.30255	9.99991	10.00009	11.69745	8.30263	11.69737	51
10	8.30879	9.99991	10.00009	11.69121	8.30888	11.69112	50
11	8.31495	9.99991	10.00009	11.68505	8.31505	11.68495	49
12	8.32103	9.99990	10.00010	11.67897	8.32112	11.67888	48
13	8.32702	9.99990	10.00010	11.67298	8.32711	11.67289	47
14	8.33292	9.99990	10.00010	11.66708	8.33302	11.66698	46
15	8.33875	9.99990	10.00010	11.66125	8.33886	11.66114	45
16	8.34450	9.99989	10.00011	11.65550	8.34461	11.65539	44
17	8.35018	9.99989	10.00011	11.64982	8.35029	11.64971	43
18	8.35578	9.99989	10.00011	11.64422	8.35590	11.64410	42
19	8.36131	9.99989	10.00011	11.63869	8.36143	11.63857	41
20	8.36678	9.99988	10.00012	11.63322	8.36689	11.63311	40
21	8.37217	9.99988	10.00012	11.62783	8.37229	11.62771	39
22	8.37750	9.99988	10.00012	11.62250	8.37762	11.62238	38
23	8.38276	9.99987	10.00013	11.61724	8.38289	11.61711	37
24	8.38796	9.99987	10.00013	11.61204	8.38809	11.61191	36
25	8.39310	9.99987	10.00013	11.60690	8.39323	11.60677	35
26	8.39818	9.99986	10.00014	11.60182	8.39832	11.60168	34
27	8.40320	9.99986	10.00014	11.59680	8.40334	11.59666	33
28	8.40816	9.99986	10.00014	11 59184	8.40830	11.59170	32
29	8.41307	9.99985	10.00015	11.58693	8.41321	11.58679	31
30	8.41792	9.99985	10.00015	11.58208	8.41807	11.58193	30
31	8.42272	9.99985	10.00015	11.57728	8.42287	11.57713	29
32	8.42746	9.99984	10.00016	11.57254	8.42762	11.57238	28
33	8.43216	9.99984	10.00016	11.56784	8.43232	11.56768	27
34	8.43680	9.99984	10.00016	11.56320	8.43696	11.56304	26
35	8.44139	9.99983	10.00017	11.55861	8.44156	11.55844	25
36	8.44594	9.99983	10.00017	11.55406	8.44611	11.55389	24
37	8.45044	9.99983	10.00017	11.54956	8.45061	11.54939	23
38	8.45489	9.99982	10.00018	11.54511	8.45507	11.54493	22
39	8.45930	9.99982	10.00018	11.54070	8.45948	11.54052	21
40	8.46366	9.99982	10.00018	11.53634	8.46385	11.53615	20
41	8.46799	9.99981	10.00019	11.53201	8.46817	11.53183	19
42	8.47226	9.99981	10.00019	11.52774	8.47245	11.52755	18
43	8.47650	9.99981	10.00019	11.52350	8.47669	11.52331	17
44	8.48069	9.99980	10.00020	11.51931	8.48089	11.51911	16
45	8.48485	9.99980	10.00020	11.51515	8.48505	11.51495	15
46	8.48896	9.99979	10.00021	11.51104	8.48917	11.51083	14
47	8.49304	9.99979	10.00021	11.50696	8.49325	11.50675	13
48	8.49708	9.99979	10.00021	11.50292	8.49729	11.50271	12
49	8.50108	9.99978	10.00022	11.49892	8.50130	11.49870	11
50	8.50504	9.99978	10.00022	11.49496	8.50527	11.49473	10
51	8.50897	9.99977	10.00023	11.49103	8.50920	11.49080	9
52	8.51287	9.99977	10.00023	11.48713	8.51310	11.48690	8
53	8.51673	9.99977	10.00023	11.48327	8.51696	11.48304	7
54	8.52055	9.99976	10.00024	11.47945	8.52079	11.47921	6
55	8.52434	9.99976	10.00024	11.47566	8.52459	11.47541	5
56	8.52810	9.99975	10.00025	11.47190	8.52835	11.47165	4
57	8.53183	9.99975	10.00025	11.46817	8.53208	11.46792	3
58	8.53552	9.99974	10.00026	11.46448	8.53578	11.46422	2
59	8.53919	9.99974	10.00026	11.46081	8.53945	11.46055	1
60	8.54282	9.99974	10.00026	11.45718	8.54308	11.45692	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

2°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	8.54282	9.99974	10.00026	11.45718	8.54308	11.45692	60
1	8.54642	9.99973	10.00027	11.45358	8.54669	11.45331	59
2	8.54999	9.99973	10.00027	11.45001	8.55027	11.44973	58
3	8.55354	9.99972	10.00028	11.44646	8.55382	11.44618	57
4	8.55705	9.99972	10.00028	11.44295	8.55734	11.44266	56
5	8.56054	9.99971	10.00029	11.43946	8.56083	11.43917	55
6	8.56400	9.99971	10.00029	11.43600	8.56429	11.43571	54
7	8.56743	9.99970	10.00030	11.43257	8.56773	11.43227	53
8	8.57084	9.99970	10.00030	11.42916	8.57114	11.42886	52
9	8.57421	9.99969	10.00031	11.42579	8.57452	11.42548	51
10	8.57757	9.99969	10.00031	11.42243	8.57788	11.42212	50
11	8.58089	9.99968	10.00032	11.41911	8.58121	11.41879	49
12	8.58419	9.99968	10.00032	11.41581	8.58451	11.41549	48
13	8.58747	9.99967	10.00033	11.41253	8.58779	11.41221	47
14	8.59072	9.99967	10.00033	11.40928	8.59105	11.40895	46
15	8.59395	9.99967	10.00033	11.40605	8.59428	11.40572	45
16	8.59715	9.99966	10.00034	11.40285	8.59749	11.40251	44
17	8.60033	9.99966	10.00034	11.39967	8.60068	11.39932	43
18	8.60349	9.99965	10.00035	11.39651	8.60384	11.39616	42
19	8.60662	9.99964	10.00036	11.39338	8.60698	11.39302	41
20	8.60973	9.99964	10.00036	11.39027	8.61009	11.38991	40
21	8.61282	9.99963	10.00037	11.38718	8.61319	11.38681	39
22	8.61589	9.99963	10.00037	11.38411	8.61626	11.38374	38
23	8.61894	9.99962	10.00038	11.38106	8.61931	11.38069	37
24	8.62196	9.99962	10.00038	11.37804	8.62234	11.37766	36
25	8.62497	9.99961	10.00039	11.37503	8.62535	11.37465	35
26	8.62795	9.99961	10.00039	11.37205	8.62834	11.37166	34
27	8.63091	9.99960	10.00040	11.36909	8.63131	11.36869	33
28	8.63385	9.99960	10.00040	11.36615	8.63426	11.36574	32
29	8.63678	9.99959	10.00041	11.36322	8.63718	11.36282	31
30	8.63968	9.99959	10.00041	11.36032	8.64009	11.35991	30
31	8.64256	9.99958	10.00042	11.35744	8.64298	11.35702	29
32	8.64543	9.99958	10.00042	11.35457	8.64585	11.35415	28
33	8.64827	9.99957	10.00043	11.35173	8.64870	11.35130	27
34	8.65110	9.99956	10.00044	11.34890	8.65154	11.34846	26
35	8.65391	9.99956	10.00044	11.34609	8.65435	11.34565	25
36	8.65670	9.99955	10.00045	11.34330	8.65715	11.34285	24
37	8.65947	9.99955	10.00045	11.34053	8.65993	11.34007	23
38	8.66223	9.99954	10.00046	11.33777	8.66269	11.33731	22
39	8.66497	9.99954	10.00046	11.33503	8.66543	11.33457	21
40	8.66769	9.99953	10.00047	11.33231	8.66816	11.33184	20
41	8.67039	9.99952	10.00048	11.32961	8.67087	11.32913	19
42	8.67308	9.99952	10.00048	11.32692	8.67356	11.32644	18
43	8.67575	9.99951	10.00049	11.32425	8.67624	11.32376	17
44	8.67841	9.99951	10.00049	11.32159	8.67890	11.32110	16
45	8.68104	9.99950	10.00050	11.31896	8.68154	11.31846	15
46	8.68367	9.99949	10.00051	11.31633	8.68417	11.31583	14
47	8.68627	9.99949	10.00051	11.31373	8.68678	11.31322	13
48	8.68886	9.99948	10.00052	11.31114	8.68938	11.31062	12
49	8.69144	9.99948	10.00052	11.30856	8.69196	11.30804	11
50	8.69400	9.99947	10.00053	11.30600	8.69453	11.30547	10
51	8.69654	9.99946	10.00054	11.30346	8.69708	11.30292	9
52	8.69907	9.99946	10.00054	11.30093	8.69962	11.30038	8
53	8.70159	9.99945	10.00055	11.29841	8.70214	11.29786	7
54	8.70409	9.99944	10.00056	11.29591	8.70465	11.29535	6
55	8.70658	9.99944	10.00056	11.29342	8.70714	11.29286	5
56	8.70905	9.99943	10.00057	11.29095	8.70962	11.29038	4
57	8.71151	9.99942	10.00058	11.28849	8.71208	11.28792	3
58	8.71395	9.99942	10.00058	11.28605	8.71453	11.28547	2
59	8.71638	9.99941	10.00059	11.28362	8.71697	11.28303	1
60	8.71880	9.99940	10.00060	11.28120	8.71940	11.28060	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

3°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	8.71880	9.99940	10.00060	11.28120	8.71940	11.28060	60
1	8.72120	9.99940	10.00060	11.27880	8.72181	11.27819	59
2	8.72359	9.99939	10.00061	11.27641	8.72420	11.27580	58
3	8.72597	9.99938	10.00062	11.27403	8.72659	11.27341	57
4	8.72834	9.99938	10.00062	11.27166	8.72896	11.27104	56
5	8.73069	9.99937	10.00063	11.26931	8.73132	11.26868	55
6	8.73303	9.99936	10.00064	11.26697	8.73366	11.26634	54
7	8.73535	9.99936	10.00064	11.26465	8.73600	11.26400	53
8	8.73767	9.99935	10.00065	11.26233	8.73832	11.26168	52
9	8.73997	9.99934	10.00066	11.26003	8.74063	11.25937	51
10	8.74226	9.99934	10.00066	11.25774	8.74292	11.25708	50
11	8.74454	9.99933	10.00067	11.25546	8.74521	11.25479	49
12	8.74680	9.99932	10.00068	11.25320	8.74748	11.25252	48
13	8.74906	9.99932	10.00068	11.25094	8.74974	11.25026	47
14	8.75130	9.99931	10.00069	11.24870	8.75199	11.24801	46
15	8.75353	9.99930	10.00070	11.24647	8.75423	11.24577	45
16	8.75575	9.99929	10.00071	11.24425	8.75645	11.24355	44
17	8.75795	9.99929	10.00071	11.24205	8.75867	11.24133	43
18	8.76015	9.99928	10.00072	11.23985	8.76087	11.23913	42
19	8.76234	9.99927	10.00073	11.23766	8.76306	11.23694	41
20	8.76451	9.99926	10.00074	11.23549	8.76525	11.23475	40
21	8.76667	9.99926	10.00074	11.23333	8.76742	11.23258	39
22	8.76883	9.99925	10.00075	11.23117	8.76958	11.23042	38
23	8.77097	9.99924	10.00076	11.22903	8.77173	11.22827	37
24	8.77310	9.99923	10.00077	11.22690	8.77387	11.22613	36
25	8.77522	9.99923	10.00077	11.22478	8.77600	11.22400	35
26	8.77733	9.99922	10.00078	11.22267	8.77811	11.22189	34
27	8.77943	9.99921	10.00079	11.22057	8.78022	11.21978	33
28	8.78152	9.99920	10.00080	11.21848	8.78232	11.21768	32
29	8.78360	9.99920	10.00080	11.21640	8.78441	11.21559	31
30	8.78568	9.99919	10.00081	11.21432	8.78649	11.21351	30
31	8.78774	9.99918	10.00082	11.21226	8.78855	11.21145	29
32	8.78979	9.99917	10.00083	11.21021	8.79061	11.20939	28
33	8.79183	9.99917	10.00083	11.20817	8.79266	11.20734	27
34	8.79386	9.99916	10.00084	11.20614	8.79470	11.20530	26
35	8.79588	9.99915	10.00085	11.20412	8.79673	11.20327	25
36	8.79789	9.99914	10.00086	11.20211	8.79875	11.20125	24
37	8.79990	9.99913	10.00087	11.20010	8.80076	11.19924	23
38	8.80189	9.99913	10.00087	11.19811	8.80277	11.19723	22
39	8.80388	9.99912	10.00088	11.19612	8.80476	11.19524	21
40	8.80585	9.99911	10.00089	11.19415	8.80674	11.19326	20
41	8.80782	9.99910	10.00090	11.19218	8.80872	11.19128	19
42	8.80978	9.99909	10.00091	11.19022	8.81068	11.18932	18
43	8.81173	9.99909	10.00091	11.18827	8.81264	11.18736	17
44	8.81367	9.99908	10.00092	11.18633	8.81459	11.18541	16
45	8.81560	9.99907	10.00093	11.18440	8.81653	11.18347	15
46	8.81752	9.99906	10.00094	11.18248	8.81846	11.18154	14
47	8.81944	9.99905	10.00095	11.18056	8.82038	11.17962	13
48	8.82134	9.99904	10.00096	11.17866	8.82230	11.17770	12
49	8.82324	9.99904	10.00096	11.17676	8.82420	11.17580	11
50	8.82513	9.99903	10.00097	11.17487	8.82610	11.17390	10
51	8.82701	9.99902	10.00098	11.17299	8.82799	11.17201	9
52	8.82888	9.99901	10.00099	11.17112	8.82987	11.17013	8
53	8.83075	9.99900	10.00100	11.16925	8.83175	11.16825	7
54	8.83261	9.99899	10.00101	11.16739	8.83361	11.16639	6
55	8.83446	9.99898	10.00102	11.16554	8.83547	11.16453	5
56	8.83630	9.99898	10.00102	11.16370	8.83732	11.16268	4
57	8.83813	9.99897	10.00103	11.16187	8.83916	11.16084	3
58	8.83996	9.99896	10.00104	11.16004	8.84100	11.15900	2
59	8.84177	9.99895	10.00105	11.15823	8.84282	11.15718	1
60	8.84358	9.99894	10.00106	11.15642	8.84464	11.15536	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

4°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	8.84358	9.99894	10.00106	11.15642	8.84464	11.15536	60
1	8.84539	9.99893	10.00107	11.15461	8.84646	11.15354	59
2	8.84718	9.99892	10.00108	11.15282	8.84826	11.15174	58
3	8.84897	9.99891	10.00109	11.15103	8.85006	11.14994	57
4	8.85075	9.99891	10.00109	11.14925	8.85185	11.14815	56
5	8.85252	9.99890	10.00110	11.14748	8.85363	11.14637	55
6	8.85429	9.99889	10.00111	11.14571	8.85540	11.14460	54
7	8.85605	9.99888	10.00112	11.14395	8.85717	11.14283	53
8	8.85780	9.99887	10.00113	11.14220	8.85893	11.14107	52
9	8.85955	9.99886	10.00114	11.14045	8.86069	11.13931	51
10	8.86128	9.99885	10.00115	11.13872	8.86243	11.13757	50
11	8.86301	9.99884	10.00116	11.13699	8.86417	11.13583	49
12	8.86474	9.99883	10.00117	11.13526	8.86591	11.13409	48
13	8.86645	9.99882	10.00118	11.13355	8.86763	11.13237	47
14	8.86816	9.99881	10.00119	11.13184	8.86935	11.13065	46
15	8.86987	9.99880	10.00120	11.13013	8.87106	11.12894	45
16	8.87156	9.99879	10.00121	11.12844	8.87277	11.12723	44
17	8.87325	9.99879	10.00121	11.12675	8.87447	11.12553	43
18	8.87494	9.99878	10.00122	11.12506	8.87616	11.12384	42
19	8.87661	9.99877	10.00123	11.12339	8.87785	11.12215	41
20	8.87829	9.99876	10.00124	11.12171	8.87953	11.12047	40
21	8.87995	9.99875	10.00125	11.12005	8.88120	11.11880	39
22	8.88161	9.99874	10.00126	11.11839	8.88287	11.11713	38
23	8.88326	9.99873	10.00127	11.11674	8.88453	11.11547	37
24	8.88490	9.99872	10.00128	11.11510	8.88618	11.11382	36
25	8.88654	9.99871	10.00129	11.11346	8.88783	11.11217	35
26	8.88817	9.99870	10.00130	11.11183	8.88948	11.11052	34
27	8.88980	9.99869	10.00131	11.11020	8.89111	11.10889	33
28	8.89142	9.99868	10.00132	11.10858	8.89274	11.10726	32
29	8.89304	9.99867	10.00133	11.10696	8.89437	11.10563	31
30	8.89464	9.99866	10.00134	11.10536	8.89598	11.10402	30
31	8.89625	9.99865	10.00135	11.10375	8.89760	11.10240	29
32	8.89784	9.99864	10.00136	11.10216	8.89920	11.10080	28
33	8.89943	9.99863	10.00137	11.10057	8.90080	11.09920	27
34	8.90102	9.99862	10.00138	11.09898	8.90240	11.09760	26
35	8.90260	9.99861	10.00139	11.09740	8.90399	11.09601	25
36	8.90417	9.99860	10.00140	11.09583	8.90557	11.09443	24
37	8.90574	9.99859	10.00141	11.09426	8.90715	11.09285	23
38	8.90730	9.99858	10.00142	11.09270	8.90872	11.09128	22
39	8.90885	9.99857	10.00143	11.09115	8.91029	11.08971	21
40	8.91040	9.99856	10.00144	11.08960	8.91185	11.08815	20
41	8.91195	9.99855	10.00145	11.08805	8.91340	11.08660	19
42	8.91349	9.99854	10.00146	11.08651	8.91495	11.08505	18
43	8.91502	9.99853	10.00147	11.08498	8.91650	11.08350	17
44	8.91655	9.99852	10.00148	11.08345	8.91803	11.08197	16
45	8.91807	9.99851	10.00149	11.08193	8.91957	11.08043	15
46	8.91959	9.99850	10.00150	11.08041	8.92110	11.07890	14
47	8.92110	9.99848	10.00152	11.07890	8.92262	11.07738	13
48	8.92261	9.99847	10.00153	11.07739	8.92414	11.07586	12
49	8.92411	9.99846	10.00154	11.07589	8.92565	11.07435	11
50	8.92561	9.99845	10.00155	11.07439	8.92716	11.07284	10
51	8.92710	9.99844	10.00156	11.07290	8.92866	11.07134	9
52	8.92859	9.99843	10.00157	11.07141	8.93016	11.06984	8
53	8.93007	9.99842	10.00158	11.06993	8.93165	11.06835	7
54	8.93154	9.99841	10.00159	11.06846	8.93313	11.06687	6
55	8.93301	9.99840	10.00160	11.06699	8.93462	11.06538	5
56	8.93448	9.99839	10.00161	11.06552	8.93609	11.06391	4
57	8.93594	9.99838	10.00162	11.06406	8.93756	11.06244	3
58	8.93740	9.99837	10.00163	11.06260	8.93903	11.06097	2
59	8.93885	9.99836	10.00164	11.06115	8.94049	11.05951	1
60	8.94030	9.99834	10.00166	11.05970	8.94195	11.05805	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

5°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	8.94030	9.99834	10.00166	11.05970	8.94195	11.05805	60
1	8.94174	9.99833	10.00167	11.05826	8.94340	11.05660	59
2	8.94317	9.99832	10.00168	11.05683	8.94485	11.05515	58
3	8.94461	9.99831	10.00169	11.05539	8.94630	11.05370	57
4	8.94603	9.99830	10.00170	11.05397	8.94773	11.05227	56
5	8.94746	9.99829	10.00171	11.05254	8.94917	11.05083	55
6	8.94887	9.99828	10.00172	11.05113	8.95060	11.04940	54
7	8.95029	9.99827	10.00173	11.04971	8.95202	11.04798	53
8	8.95170	9.99825	10.00175	11.04830	8.95344	11.04656	52
9	8.95310	9.99824	10.00176	11.04690	8.95486	11.04514	51
10	8.95450	9.99823	10.00177	11.04550	8.95627	11.04373	50
11	8.95589	9.99822	10.00178	11.04411	8.95767	11.04233	49
12	8.95728	9.99821	10.00179	11.04272	8.95908	11.04092	48
13	8.95867	9.99820	10.00180	11.04133	8.96047	11.03953	47
14	8.96005	9.99819	10.00181	11.03995	8.96187	11.03813	46
15	8.96143	9.99817	10.00183	11.03857	8.96325	11.03675	45
16	8.96280	9.99816	10.00184	11.03720	8.96464	11.03536	44
17	8.96417	9.99815	10.00185	11.03583	8.96602	11.03398	43
18	8.96553	9.99814	10.00186	11.03447	8.96739	11.03261	42
19	8.96689	9.99813	10.00187	11.03311	8.96877	11.03123	41
20	8.96825	9.99812	10.00188	11.03175	8.97013	11.02987	40
21	8.96960	9.99810	10.00190	11.03040	8.97150	11.02850	39
22	8.97095	9.99809	10.00191	11.02905	8.97285	11.02715	38
23	8.97229	9.99808	10.00192	11.02771	8.97421	11.02579	37
24	8.97363	9.99807	10.00193	11.02637	8.97556	11.02444	36
25	8.97496	9.99806	10.00194	11.02504	8.97691	11.02309	35
26	8.97629	9.99804	10.00196	11.02371	8.97825	11.02175	34
27	8.97762	9.99803	10.00197	11.02238	8.97959	11.02041	33
28	8.97894	9.99802	10.00198	11.02106	8.98092	11.01908	32
29	8.98026	9.99801	10.00199	11.01974	8.98225	11.01775	31
30	8.98157	9.99800	10.00200	11.01843	8.98358	11.01642	30
31	8.98288	9.99798	10.00202	11.01712	8.98490	11.01510	29
32	8.98419	9.99797	10.00203	11.01581	8.98622	11.01378	28
33	8.98549	9.99796	10.00204	11.01451	8.98753	11.01247	27
34	8.98679	9.99795	10.00205	11.01321	8.98884	11.01116	26
35	8.98808	9.99793	10.00207	11.01192	8.99015	11.00985	25
36	8.98937	9.99792	10.00208	11.01063	8.99145	11.00855	24
37	8.99066	9.99791	10.00209	11.00934	8.99275	11.00725	23
38	8.99194	9.99790	10.00210	11.00806	8.99405	11.00595	22
39	8.99322	9.99788	10.00212	11.00678	8.99534	11.00466	21
40	8.99450	9.99787	10.00213	11.00550	8.99662	11.00338	20
41	8.99577	9.99786	10.00214	11.00423	8.99791	11.00209	19
42	8.99704	9.99785	10.00215	11.00296	8.99919	11.00081	18
43	8.99830	9.99783	10.00217	11.00170	9.00046	10.99954	17
44	8.99956	9.99782	10.00218	11.00044	9.00174	10.99826	16
45	9.00082	9.99781	10.00219	10.99918	9.00301	10.99699	15
46	9.00207	9.99780	10.00220	10.99793	9.00427	10.99573	14
47	9.00332	9.99778	10.00222	10.99668	9.00553	10.99447	13
48	9.00456	9.99777	10.00223	10.99544	9.00679	10.99321	12
49	9.00581	9.99776	10.00224	10.99419	9.00805	10.99195	11
50	9.00704	9.99775	10.00225	10.99296	9.00930	10.99070	10
51	9.00828	9.99773	10.00227	10.99172	9.01055	10.98945	9
52	9.00951	9.99772	10.00228	10.99049	9.01179	10.98821	8
53	9.01074	9.99771	10.00229	10.98926	9.01303	10.98697	7
54	9.01196	9.99769	10.00231	10.98804	9.01427	10.98573	6
55	9.01318	9.99768	10.00232	10.98682	9.01550	10.98450	5
56	9.01440	9.99767	10.00233	10.98560	9.01673	10.98327	4
57	9.01561	9.99765	10.00235	10.98439	9.01796	10.98204	3
58	9.01682	9.99764	10.00236	10.98318	9.01918	10.98082	2
59	9.01803	9.99763	10.00237	10.98197	9.02040	10.97960	1
60	9.01923	9.99761	10.00239	10.98077	9.02162	10.97838	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang	Tangent.	′

6°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.01923	9.99761	10.00239	10.98077	9.02162	10.97838	60
1	9.02043	9.99760	10.00240	10.97957	9.02283	10.97717	59
2	9.02163	9.99759	10.00241	10.97837	9.02404	10.97596	58
3	9.02283	9.99757	10.00243	10.97717	9.02525	10.97475	57
4	9.02402	9.99756	10,00244	10.97598	9.02645	10.97355	56
5	9.02520	9.99755	10.00245	10.97480	9.02766	10.97234	55
6	9.02639	9.99753	10.00247	10.97361	9.02885	10.97115	54
7	9.02757	9.99752	10.00248	10.97243	9.03005	10.96995	53
8	9.02874	9.99751	10.00249	10.97126	9.03124	10.96876	52
9	9.02992	9.99749	10.00251	10.97008	9.03242	10.96758	51
10	9.03109	9.99748	10.00252	10.96891	9.03361	10.96639	50
11	9.03226	9.99747	10.00253	10.96774	9.03479	10.96521	49
12	9.03342	9 99745	10.00255	10.96658	9.03597	10.96403	48
13	9.03458	9.99744	10.00256	10.96542	9.03714	10.96286	47
14	9.03574	9.99742	10.00258	10.96426	9.03832	10.96168	46
15	9.03690	9.99741	10.00259	10.96310	9.03948	10.96052	45
16	9.03805	9.99740	10.00260	10.96195	9.04065	10.95935	44
17	9.03920	9.99738	10.00262	10.96080	9.04181	10.95819	43
18	9.04034	9.99737	10.00263	10.95966	9.04297	10.95703	42
19	9.04149	9.99736	10.00264	10.95851	9.04413	10.95587	41
20	9.04262	9.99734	10.00266	10.95738	9.04528	10.95472	40
21	9.04376	9.99733	10.00267	10.95624	9.04643	10.95357	39
22	9.04490	9.99731	10.00269	10.95510	9.04758	10.95242	38
23	9.04603	9.99730	10.00270	10.95397	9.04873	10.95127	37
24	9.04715	9.99728	10.00272	10.95285	9.04987	10.95013	36
25	9.04828	9.99727	10.00273	10.95172	9.05101	10.94899	35
26	9.04940	9.99726	10.00274	10.95060	9.05214	10.94786	34
27	9.05052	9.99724	10.00276	10.94948	9.05328	10.94672	33
28	9.05164	9.99723	10.00277	10.94836	9.05441	10.94559	32
29	9.05275	9.99721	10.00279	10.94725	9.05553	10.94447	31
30	9.05386	9.99720	10.00280	10.94614	9.05666	10.94334	30
31	9.05497	9.99718	10.00282	10.94503	9.05778	10.94222	29
32	9.05607	9.99717	10.00283	10.94393	9.05890	10.94110	28
33	9.05717	9.99716	10.00284	10.94283	9.06002	10.93998	27
34	9.05827	9.99714	10.00286	10.94173	9.06113	10.93887	26
35	9.05937	9.99713	10.00287	10.94063	9.06224	10.93776	25
36	9.06046	9.99711	10.00289	10.93954	9.06335	10.93665	24
37	9.06155	9.99710	10.00290	10.93845	9.06445	10.93555	23
38	9.06264	9.99708	10.00292	10.93736	9.06556	10.93444	22
39	9.06372	9.99707	10.00293	10.93628	9.06666	10.93334	21
40	9.06481	9.99705	10.00295	10.93519	9.06775	10.93225	20
41	9.06589	9.99704	10.00296	10.93411	9.06885	10.93115	19
42	9.06696	9.99702	10.00298	10.93304	9.06994	10.93006	18
43	9.06804	9.99701	10.00299	10.93196	9.07103	10.92897	17
44	9.06911	9.99699	10.00301	10.93089	9.07211	10.92789	16
45	9.07018	9.99698	10.00302	10.92982	9.07320	10.92680	15
46	9.07124	9.99696	10.00304	10.92876	9.07428	10.92572	14
47	9.07231	9.99695	10.00305	10.92769	9.07536	10.92464	13
48	9.07337	9.99693	10.00307	10.92663	9.07643	10.92357	12
49	9.07442	9.99692	10.00308	10.92558	9.07751	10.92249	11
50	9.07548	9.99690	10.00310	10.92452	9.07858	10.92142	10
51	9.07653	9.99689	10.00311	10.92347	9.07964	10.92036	9
52	9.07758	9.99687	10.00313	10.92242	9.08071	10.91929	8
53	9.07863	9.99686	10.00314	10.92137	9.08177	10.91823	7
54	9.07968	9.99684	10.00316	10.92032	9.08283	10.91717	6
55	9.08072	9.99683	10.00317	10.91928	9.08389	10.91611	5
56	9.08176	9.99681	10.00319	10.91824	9.08495	10.91505	4
57	9.08280	9.99680	10.00320	10.91720	9.08600	10.91400	3
58	9.08383	9.99678	10.00322	10.91617	9.08705	10.91295	2
59	9.08486	9.99677	10.00323	10.91514	9.08810	10.91190	1
60	9.08589	9.99675	10.00325	10.91411	9.08914	10.91086	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

7°

	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.08589	9.99675	10.00325	10.91411	9.08914	10.91086	60
1	9.08692	9.99674	10.00326	10.91308	9.09019	10.90981	59
2	9.08795	9.99672	10.00328	10.91205	9.09123	10.90877	58
3	9.08897	9.99670	10.00330	10.91103	9.09227	10.90773	57
4	9.08999	9.99669	10.00331	10.91001	9.09330	10.90670	56
5	9.09101	9.99667	10.00333	10.90899	9.09434	10.90566	55
6	9.09202	9.99666	10.00334	10.90798	9.09537	10.90463	54
7	9.09304	9.99664	10.00336	10.90696	9.09640	10.90360	53
8	9.09405	9.99663	10.00337	10.90595	9.09742	10.90258	52
9	9.09506	9.99661	10.00339	10.90494	9.09845	10.90155	51
10	9.09606	9.99659	10.00341	10.90394	9.09947	10.90053	50
11	9.09707	9.99658	10.00342	10.90293	9.10049	10.89951	49
12	9.09807	9.99656	10.00344	10.90193	9.10150	10.89850	48
13	9.09907	9.99655	10.00345	10.90093	9.10252	10.89748	47
14	9.10006	9.99653	10.00347	10.89994	9.10353	10.89647	46
15	9.10106	9.99651	10.00349	10.89894	9.10454	10.89546	45
16	9.10205	9.99650	10.00350	10.89795	9.10555	10.89445	44
17	9.10304	9.99648	10.00352	10.89696	9.10656	10.89344	43
18	9.10402	9.99647	10.00353	10.89598	9.10756	10.89244	42
19	9.10501	9.99645	10.00355	10.89499	9.10856	10.89144	41
20	9.10599	9.99643	10.00357	10.89401	9.10956	10.89044	40
21	9.10697	9.99642	10.00358	10.89303	9.11056	10.88944	39
22	9.10795	9.99640	10.00360	10.89205	9.11155	10.88845	38
23	9.10893	9.99638	10.00362	10.89107	9.11254	10.88746	37
24	9.10990	9.99637	10.00363	10.89010	9.11353	10.88647	36
25	9.11087	9.99635	10.00365	10.88913	9.11452	10.88548	35
26	9.11184	9.99633	10.00367	10.88816	9.11551	10.88449	34
27	9.11281	9.99632	10.00368	10.88719	9.11649	10.88351	33
28	9.11377	9.99630	10.00370	10.88623	9.11747	10.88253	32
29	9.11474	9.99629	10.00371	10.88526	9.11845	10.88155	31
30	9.11570	9.99627	10.00373	10.88430	9.11943	10.88057	30
31	9.11666	9.99625	10.00375	10.88334	9.12040	10.87960	29
32	9.11761	9.99624	10.00376	10.88239	9.12138	10.87862	28
33	9.11857	9.99622	10.00378	10.88143	9.12235	10.87765	27
34	9.11952	9.99620	10.00380	10.88048	9.12332	10.87668	26
35	9.12047	9.99618	10.00382	10.87953	9.12428	10.87572	25
36	9.12142	9.99617	10.00383	10.87858	9.12525	10.87475	24
37	9.12236	9.99615	10.00385	10.87764	9.12621	10.87379	23
38	9.12331	9.99613	10.00387	10.87669	9.12717	10.87283	22
39	9.12425	9.99612	10.00388	10.87575	9.12813	10.87187	21
40	9.12519	9.99610	10.00390	10.87481	9.12909	10.87091	20
41	9.12612	9.99608	10.00392	10.87388	9.13004	10.86996	19
42	9.12706	9.99607	10.00393	10.87294	9.13099	10.86901	18
43	9.12799	9.99605	10.00395	10.87201	9.13194	10.86806	17
44	9.12892	9.99603	10.00397	10.87108	9.13289	10.86711	16
45	9.12985	9.99601	10.00399	10.87015	9.13384	10.86616	15
46	9.13078	9.99600	10.00400	10.86922	9.13478	10.86522	14
47	9.13171	9.99598	10.00402	10.86829	9.13573	10.86427	13
48	9.13263	9.99596	10.00404	10.86737	9.13667	10.86333	12
49	9.13355	9.99595	10.00405	10.86645	9.13761	10.86239	11
50	9.13447	9.99593	10.00407	10.86553	9.13854	10.86146	10
51	9.13539	9.99591	10.00409	10.86461	9.13948	10.86052	9
52	9.13630	9.99589	10.00411	10.86370	9.14041	10.85959	8
53	9.13722	9.99588	10.00412	10.86278	9.14134	10.85866	7
54	9.13813	9.99586	10.00414	10.86187	9.14227	10.85773	6
55	9.13904	9.99584	10.00416	10.86096	9.14320	10.85680	5
56	9.13994	9.99582	10.00418	10.86006	9.14412	10.85588	4
57	9.14085	9.99581	10.00419	10.85915	9.14504	10.85496	3
58	9.14175	9.99579	10.00421	10.85825	9.14597	10.85403	2
59	9.14266	9.99577	10.00423	10.85734	9.14688	10.85312	1
60	9.14356	9.99575	10.00425	10.85644	9.14780	10.85220	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

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8°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.14356	9.99575	10.00425	10.85644	9.14780	10.85220	60
1	9.14445	9.99574	10.00426	10.85555	9.14872	10.85128	59
2	9.14535	9.99572	10.00428	10.85465	9.14963	10.85037	58
3	9.14624	9.99570	10.00430	10.85376	9.15054	10.84946	57
4	9.14714	9.99568	10.00432	10.85286	9.15145	10.84855	56
5	9.14803	9.99566	10.00434	10.85197	9.15236	10.84764	55
6	9.14891	9.99565	10.00435	10.85109	9.15327	10.84673	54
7	9.14980	9.99563	10.00437	10.85020	9.15417	10.84583	53
8	9.15069	9.99561	10.00439	10.84931	9.15508	10.84492	52
9	9.15157	9.99559	10.00441	10.84843	9.15598	10.84402	51
10	9.15245	9.99557	10.00443	10.84755	9.15688	10.84312	50
11	9.15333	9.99556	10.00444	10.84667	9.15777	10.84223	49
12	9.15421	9.99554	10.00446	10.84579	9.15867	10.84133	48
13	9.15508	9.99552	10.00448	10.84492	9.15956	10.84044	47
14	9.15596	9.99550	10.00450	10.84404	9.16046	10.83954	46
15	9.15683	9.99548	10.00452	10.84317	9.16135	10.83865	45
16	9.15770	9.99546	10.00454	10.84230	9.16224	10.83776	44
17	9.15857	9.99545	10.00455	10.84143	9.16312	10.83688	43
18	9.15944	9.99543	10.00457	10.84056	9.16401	10.83599	42
19	9.16030	9.99541	10.00459	10.83970	9.16489	10.83511	41
20	9.16116	9.99539	10.00461	10.83884	9.16577	10.83423	40
21	9.16203	9.99537	10.00463	10.83797	9.16665	10.83335	39
22	9.16289	9.99535	10.00465	10.83711	9.16753	10.83247	38
23	9.16374	9.99533	10.00467	10.83626	9.16841	10.83159	37
24	9.16460	9.99532	10.00468	10.83540	9.16928	10.83072	36
25	9.16545	9.99530	10.00470	10.83455	9.17016	10.82984	35
26	9.16631	9.99528	10.00472	10.83369	9.17103	10.82897	34
27	9.16716	9.99526	10.00474	10.83284	9.17190	10.82810	33
28	9.16801	9.99524	10.00476	10.83199	9.17277	10.82723	32
29	9.16886	9.99522	10.00478	10.83114	9.17363	10.82637	31
30	9.16970	9.99520	10.00480	10.83030	9.17450	10.82550	30
31	9.17055	9.99518	10.00482	10.82945	9.17536	10.82464	29
32	9.17139	9.99517	10.00483	10.82861	9.17622	10.82378	28
33	9.17223	9.99515	10.00485	10.82777	9.17708	10.82292	27
34	9.17307	9.99513	10.00487	10.82693	9.17794	10.82206	26
35	9.17391	9.99511	10.00489	10.82609	9.17880	10.82120	25
36	9.17474	9.99509	10.00491	10.82526	9.17965	10.82035	24
37	9.17558	9.99507	10.00493	10.82442	9.18051	10.81949	23
38	9.17641	9.99505	10.00495	10.82359	9.18136	10.81864	22
39	9.17724	9.99503	10.00497	10.82276	9.18221	10.81779	21
40	9.17807	9.99501	10.00499	10.82193	9.18306	10.81694	20
41	9.17890	9.99499	10.00501	10.82110	9.18391	10.81609	19
42	9.17973	9.99497	10.00503	10.82027	9.18475	10.81525	18
43	9.18055	9.99495	10.00505	10.81945	9.18560	10.81440	17
44	9.18137	9.99494	10.00506	10.81863	9.18644	10.81356	16
45	9.18220	9.99492	10.00508	10.81780	9.18728	10.81272	15
46	9.18302	9.99490	10.00510	10.81698	9.18812	10.81183	14
47	9.18383	9.99488	10.00512	10.81617	9.18896	10.81104	13
48	9.18465	9.99486	10.00514	10.81535	9.18979	10.81021	12
49	9.18547	9.99484	10.00516	10.81453	9.19063	10.80937	11
50	9.18628	9.99482	10.00518	10.81372	9.19146	10.80854	10
51	9.18709	9.99480	10.00520	10.81291	9.19229	10.80771	9
52	9.18790	9.99478	10.00522	10.81210	9.19312	10.80688	8
53	9.18871	9.99476	10.00524	10.81129	9.19395	10.80605	7
54	9.18952	9.99474	10.00526	10.81048	9.19478	10.80522	6
55	9.19033	9.99472	10.00528	10.80967	9.19561	10.80439	5
56	9.19113	9.99470	10.00530	10.80887	9.19643	10.80357	4
57	9.19193	9.99468	10.00532	10.80807	9.19725	10.80275	3
58	9.19273	9.99466	10.00534	10.80727	9.19807	10.80193	2
59	9.19353	9.99464	10.00536	10.80647	9.19889	10.80111	1
60	9.19433	9.99462	10.00538	10.80567	9.19971	10.80029	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

9°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.19433	9.99462	10.00538	10.80567	9 19971	10.80029	60
1	9.19513	9.99460	10.00540	10.80487	9.20053	10.79947	59
2	9.19592	9.99458	10.00542	10.80408	9.20134	10.79866	58
3	9.19672	9.99456	10.00544	10.80328	9.20216	10.79784	57
4	9.19751	9.99454	10.00546	10.80249	9.20297	10.79703	56
5	9.19830	9.99452	10.00548	10.80170	9.20378	10.79622	55
6	9.19909	9.99450	10.00550	10.80091	9.20459	10.79541	54
7	9.19988	9.99448	10.00552	10.80012	9.20540	10.79460	53
8	9.20067	9.99446	10.00554	10.79933	9.20621	10.79379	52
9	9.20145	9.99444	10.00556	10.79855	9.20701	10 79299	51
10	9.20223	9.99442	10.00558	10.79777	9.20782	10.79218	50
11	9.20302	9.99440	10.00560	10.79698	9.20862	10.79138	49
12	9.20380	9.99438	10.00562	10.79620	9.20942	10.79058	48
13	9.20458	9.99436	10.00564	10.79542	9.21022	10.78978	47
14	9.20535	9.99434	10.00566	10.79465	9.21102	10.78898	46
15	9.20613	9.99432	10.00568	10.79387	9.21182	10.78818	45
16	9.20691	9.99429	10.00571	10.79309	9.21261	10.78739	44
17	9.20768	9.99427	10.00573	10.79232	9.21341	10.78659	43
18	9.20845	9.99425	10.00575	10.79155	9.21420	10.78580	42
19	9.20922	9.99423	10.00577	10.79078	9.21499	10.78501	41
20	9.20999	9.99421	10.00579	10.79001	9.21578	10.78422	40
21	9.21076	9.99419	10.00581	10.78924	9.21657	10.78343	39
22	9.21153	9.99417	10.00583	10.78847	9.21736	10.78264	38
23	9.21229	9.99415	10.00585	10.78771	9.21814	10.78186	37
24	9.21306	9.99413	10.00587	10.78694	9.21893	10.78107	36
25	9.21382	9.99411	10.00589	10.78618	9.21971	10.78029	35
26	9.21458	9.99409	10.00591	10.78542	9.22049	10.77951	34
27	9.21534	9.99407	10.00593	10.78466	9.22127	10.77873	33
28	9.21610	9.99404	10.00596	10.78390	9.22205	10.77795	32
29	9.21685	9.99402	10.00598	10.78315	9.22283	10.77717	31
30	9.21761	9.99400	10.00600	10.78239	9.22361	10.77639	30
31	9.21836	9.99398	10.00602	10.78164	9.22438	10.77562	29
32	9.21912	9.99396	10.00604	10.78088	9.22516	10.77484	28
33	9.21987	9.99394	10.00606	10.78013	9.22593	10.77407	27
34	9.22062	9.99392	10.00608	10.77938	9.22670	10.77330	26
35	9.22137	9.99390	10.00610	10.77863	9.22747	10.77253	25
36	9.22211	9.99388	10.00612	10.77789	9.22824	10.77176	24
37	9.22286	9.99385	10.00615	10.77714	9.22901	10.77099	23
38	9.22361	9.99383	10.00617	10.77639	9.22977	10.77023	22
39	9.22435	9.99381	10.00619	10.77565	9.23054	10.76946	21
40	9.22509	9.99379	10.00621	10.77491	9.23130	10.76870	20
41	9.22583	9.99377	10.00623	10.77417	9.23206	10.76794	19
42	9.22657	9.99375	10.00625	10.77343	9.23283	10.76717	18
43	9.22731	9.99372	10.00628	10.77269	9.23359	10.76641	17
44	9.22805	9.99370	10.00630	10.77195	9.23435	10.76565	16
45	9.22878	9.99368	10.00632	10.77122	9.23510	10.76490	15
46	9.22952	9.99366	10.00634	10.77048	9.23586	10.76414	14
47	9.23025	9.99364	10.00636	10.76975	9.23661	10.76339	13
48	9.23098	9.99362	10.00638	10.76902	9.23737	10.76263	12
49	9.23171	9.99359	10.00641	10.76829	9.23812	10.76188	11
50	9.23244	9.99357	10.00643	10.76756	9.23887	10.76113	10
51	9.23317	9.99355	10.00645	10.76683	9.23962	10.76038	9
52	9.23390	9.99353	10.00647	10.76610	9.24037	10.75963	8
53	9.23462	9.99351	10.00649	10.76538	9.24112	10.75888	7
54	9.23535	9.99348	10.00652	10.76465	9.24186	10.75814	6
55	9.23607	9.99346	10.00654	10.76393	9.24261	10.75739	5
56	9.23679	9.99344	10.00656	10.76321	9.24335	10.75665	4
57	9.23752	9.99342	10.00658	10.76248	9.24410	10.75590	3
58	9.23823	9.99340	10.00660	10.76177	9.24484	10.75516	2
59	9.23895	9.99337	10.00663	10.76105	9.24558	10.75442	1
60	9.23967	9.99335	10.00665	10.76033	9.24632	10.75368	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

10°

′	Sine.	Cosine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.23967	9.99335	10.00665	10.76033	9.24632	10.75368	60
1	9.24039	9.99333	10.00667	10.75961	9.24706	10.75294	59
2	9.24110	9.99331	10.00669	10.75890	9.24779	10.75221	58
3	9.24181	9.99328	10.00672	10.75819	9.24853	10.75147	57
4	9.24253	9.99326	10.00674	10.75747	9.24926	10.75074	56
5	9.24324	9.99324	10.00676	10.75676	9.25000	10.75000	55
6	9.24395	9.99322	10.00678	10.75605	9.25073	10.74927	54
7	9.24466	9.99319	10.00681	10.75534	9.25146	10.74854	53
8	9.24536	9.99317	10.00683	10.75464	9.25219	10.74781	52
9	9.24607	9.99315	10.00685	10.75393	9.25292	10.74708	51
10	9.24677	9.99313	10.00687	10.75323	9.25365	10.74635	50
11	9.24748	9.99310	10.00690	10.75252	9.25437	10.74563	49
12	9.24818	9.99308	10.00692	10.75182	9.25510	10.74490	48
13	9.24888	9.99306	10.00694	10.75112	9.25582	10.74418	47
14	9.24958	9.99304	10.00696	10.75042	9.25655	10.74345	46
15	9.25028	9.99301	10.00699	10.74972	9.25727	10.74273	45
16	9.25098	9.99299	10.00701	10.74902	9.25799	10.74201	44
17	9.25168	9.99297	10.00703	10.74832	9.25871	10.74129	43
18	9.25237	9.99294	10.00706	10.74763	9.25943	10.74057	42
19	9.25307	9.99292	10.00708	10.74693	9.26015	10.73985	41
20	9.25376	9.99290	10.00710	10.74624	9.26086	10.73914	40
21	9.25445	9.99288	10.00712	10.74555	9.26158	10.73842	39
22	9.25514	9.99285	10.00715	10.74486	9.26229	10.73771	38
23	9.25583	9.99283	10.00717	10.74417	9.26301	10.73699	37
24	9.25652	9.99281	10.00719	10.74348	9.26372	10.73628	36
25	9.25721	9.99278	10.00722	10.74279	9.26443	10.73557	35
26	9.25790	9.99276	10.00724	10.74210	9.26514	10.73486	34
27	9.25858	9.99274	10.00726	10.74142	9.26585	10.73415	33
28	9.25927	9.99271	10.00729	10.74073	9.26655	10.73345	32
29	9.25995	9.99269	10.00731	10.74005	9.26726	10.73274	31
30	9.26063	9.99267	10.00733	10.73937	9.26797	10.73203	30
31	9.26131	9.99264	10.00736	10.73869	9.26867	10.73133	29
32	9.26199	9.99262	10.00738	10.73801	9.26937	10.73063	28
33	9.26267	9.99260	10.00740	10.73733	9.27008	10.72992	27
34	9.26335	9.99257	10.00743	10.73665	9.27078	10.72922	26
35	9.26403	9.99255	10.00745	10.73597	9.27148	10.72852	25
36	9.26470	9.99252	10.00748	10.73530	9.27218	10.72782	24
37	9.26538	9.99250	10.00750	10.73462	9.27288	10.72712	23
38	9.26605	9.99248	10.00752	10.73395	9.27357	10.72643	22
39	9.26672	9.99245	10.00755	10.73328	9.27427	10.72573	21
40	9.26739	9.99243	10.00757	10.73261	9.27496	10.72504	20
41	9.26806	9.99241	10.00759	10.73194	9.27566	10.72434	19
42	9.26873	9.99238	10.00762	10.73127	9.27635	10.72365	18
43	9.26940	9.99236	10.00764	10.73060	9.27704	10.72296	17
44	9.27007	9.99233	10.00767	10.72993	9.27773	10.72227	16
45	9.27073	9.99231	10.00769	10.72927	9.27842	10.72158	15
46	9.27140	9.99229	10.00771	10.72860	9.27911	10.72089	14
47	9.27206	9.99226	10.00774	10.72794	9.27980	10.72020	13
48	9.27273	9.99224	10.00776	10.72727	9.28049	10.71951	12
49	9.27339	9.99221	10.00779	10.72661	9.28117	10.71883	11
50	9.27405	9.99219	10.00781	10.72595	9.28186	10.71814	10
51	9.27471	9.99217	10.00783	10.72529	9.28254	10.71746	9
52	9.27537	9.99214	10.00786	10.72463	9.28323	10.71677	8
53	9.27602	9.99212	10.00788	10.72398	9.28391	10.71609	7
54	9.27668	9.99209	10.00791	10.72332	9.28459	10.71541	6
55	9.27734	9.99207	10.00793	10.72266	9.28527	10.71473	5
56	9.27799	9.99204	10.00796	10.72201	9.28595	10.71405	4
57	9.27864	9.99202	10.00798	10.72136	9.28662	10.71338	3
58	9.27930	9.99200	10.00800	10.72070	9.28730	10.71270	2
59	9.27995	9.99197	10.00803	10.72005	9.28798	10.71202	1
60	9.28060	9.99195	10.00805	10.71940	9.28865	10.71135	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

11°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.28060	9.99195	10.00805	10.71940	9.28865	10.71135	60
1	9.28125	9.99192	10.00808	10.71875	9.28933	10.71067	59
2	9.28190	9.99190	10.00810	10.71810	9.29000	10.71000	58
3	9.28254	9.99187	10.00813	10.71746	9.29067	10.70933	57
4	9.28319	9.99185	10.00815	10.71681	9.29134	10.70866	56
5	9.28384	9.99182	10.00818	10.71616	9.29201	10.70799	55
6	9.28448	9.99180	10.00820	10.71552	9.29268	10.70732	54
7	9.28512	9.99177	10.00823	10.71488	9.29335	10.70665	53
8	9.28577	9.99175	10.00825	10.71423	9.29402	10.70598	52
9	9.28641	9.99172	10.00828	10.71359	9.29468	10.70532	51
10	9.28705	9.99170	10.00830	10.71295	9.29535	10.70465	50
11	9.28769	9.99167	10.00833	10.71231	9.29601	10.70399	49
12	9.28833	9.99165	10.00835	10.71167	9.29668	10.70332	48
13	9.28896	9.99162	10.00838	10.71104	9.29734	10.70266	47
14	9.28960	9.99160	10.00840	10.71040	9.29800	10.70200	46
15	9.29024	9.99157	10.00843	10.70976	9.29866	10.70134	45
16	9.29087	9.99155	10.00845	10.70913	9.29932	10.70068	44
17	9.29150	9.99152	10.00848	10.70850	9.29998	10.70002	43
18	9.29214	9.99150	10.00850	10.70786	9.30064	10.69936	42
19	9.29277	9.99147	10.00853	10.70723	9.30130	10.69870	41
20	9.29340	9.99145	10.00855	10.70660	9.30195	10.69805	40
21	9.29403	9.99142	10.00858	10.70597	9.30261	10.69739	39
22	9.29466	9.99140	10.00860	10.70534	9.30326	10.69674	38
23	9.29529	9.99137	10.00863	10.70471	9.30391	10.69609	37
24	9.29591	9.99135	10.00865	10.70409	9.30457	10.69543	36
25	9.29654	9.99132	10.00868	10.70346	9.30522	10.69478	35
26	9.29716	9.99130	10.00870	10.70284	9.30587	10.69413	34
27	9.29779	9.99127	10.00873	10.70221	9.30652	10.69348	33
28	9.29841	9.99124	10.00876	10.70159	9.30717	10.69283	32
29	9.29903	9.99122	10.00878	10.70097	9.30782	10.69218	31
30	9.29966	9.99119	10.00881	10.70034	9.30846	10.69154	30
31	9.30028	9.99117	10.00883	10.69972	9.30911	10.69089	29
32	9.30090	9.99114	10.00886	10.69910	9.30975	10.69025	28
33	9.30151	9.99112	10.00888	10.69849	9.31040	10.68960	27
34	9.30213	9.99109	10.00891	10.69787	9.31104	10.68896	26
35	9.30275	9.99106	10.00894	10.69725	9.31168	10 68832	25
36	9.30336	9.99104	10.00896	10.69664	9.31233	10.68767	24
37	9.30398	9.99101	10.00899	10.69602	9.31297	10.68703	23
38	9.30459	9.99099	10.00901	10.69541	9.31361	10.68639	22
39	9.30521	9.99096	10.00904	10.69479	9.31425	10.68575	21
40	9.30582	9.99093	10.00907	10.69418	9.31489	10.68511	20
41	9.30643	9.99091	10.00909	10.69357	9.31552	10.68448	19
42	9.30704	9.99088	10.00912	10.69296	9.31616	10.68384	18
43	9.30765	9.99086	10.00914	10.69235	9.31679	10.68321	17
44	9.30826	9.99083	10.00917	10.69174	9.31743	10.68257	16
45	9.30887	9.99080	10.00920	10.69113	9.31806	10.68194	15
46	9.30947	9.99078	10.00922	10.69053	9.31870	10.68130	14
47	9.31008	9.99075	10.00925	10.68992	9.31933	10.68067	13
48	9.31068	9.99072	10.00928	10.68932	9.31996	10.68004	12
49	9.31129	9.99070	10.00930	10.68871	9.32059	10.67941	11
50	9.31189	9.99067	10.00933	10.68811	9.32122	10.67878	10
51	9.31250	9.99064	10.00936	10.68750	9.32185	10.67815	9
52	9.31310	9.99062	10.00938	10.68690	9.32248	10.67752	8
53	9.31370	9.99059	10.00941	10.68630	9.32311	10.67689	7
54	9.31430	9.99056	10.00944	10.68570	9.32373	10.67627	6
55	9.31490	9.99054	10.00946	10.68510	9.32436	10.67564	5
56	9.31549	9.99051	10.00949	10.68451	9.32498	10.67502	4
57	9.31609	9.99048	10.00952	10.68391	9.32561	10.67439	3
58	9.31669	9.99046	10.00954	10.68331	9.32623	10.67377	2
59	9.31728	9.99043	10.00957	10.68272	9.32685	10.67315	1
60	9.31788	9.99040	10.00960	10.68212	9.32747	10.67253	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

12°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.31788	9.99040	10.00960	10.68212	9.32747	10.67253	60
1	9.31847	9.99038	10.00962	10.68153	9.32810	10.67190	59
2	9.31907	9.99035	10.00965	10.68093	9.32872	10.67128	58
3	9.31966	9.99032	10.00968	10.68034	9.32933	10.67067	57
4	9.32025	9.99030	10.00970	10.67975	9.32995	10.67005	56
5	9.32084	9.99027	10.00973	10.67916	9.33057	10.66943	55
6	9.32143	9.99024	10.00976	10.67857	9.33119	10.66881	54
7	9.32202	9.99022	10.00978	10.67798	9.33180	10.66820	53
8	9.32261	9.99019	10.00981	10.67739	9.33242	10.66758	52
9	9.32319	9.99016	10.00984	10.67681	9.33303	10.66697	51
10	9.32378	9.99013	10.00987	10.67622	9.33365	10.66635	50
11	9.32437	9.99011	10.00989	10.67563	9.33426	10.66574	49
12	9.32495	9.99008	10.00992	10.67505	9.33487	10.66513	48
13	9.32553	9.99005	10.00995	10.67447	9.33548	10.66452	47
14	9.32612	9.99002	10.00998	10.67388	9.33609	10.66391	46
15	9.32670	9.99000	10.01000	10.67330	9.33670	10.66330	45
16	9.32728	9.98997	10.01003	10.67272	9.33731	10.66269	44
17	9.32786	9.98994	10.01006	10.67214	9.33792	10.66208	43
18	9.32844	9.98991	10.01009	10.67156	9.33853	10.66147	42
19	9.32902	9.98989	10.01011	10.67098	9.33913	10.66087	41
20	9.32960	9.98986	10.01014	10.67040	9.33974	10.66026	40
21	9.33018	9.98983	10.01017	10.66982	9.34034	10.65966	39
22	9.33075	9.98980	10.01020	10.66925	9.34095	10.65905	38
23	9.33133	9.98978	10.01022	10.66867	9.34155	10.65845	37
24	9.33190	9.98975	10.01025	10.66810	9.34215	10.65785	36
25	9.33248	9.98972	10.01028	10.66752	9.34276	10.65724	35
26	9.33305	9.98969	10.01031	10.66695	9.34336	10.65664	34
27	9.33362	9.98967	10.01033	10.66638	9.34396	10.65604	33
28	9.33420	9.98964	10.01036	10.66580	9.34456	10.65544	32
29	9.33477	9.98961	10.01039	10.66523	9.34516	10.65484	31
30	9.33534	9.98958	10.01042	10.66466	9.34576	10.65424	30
31	9.33591	9.98955	10.01045	10.66409	9.34635	10.65365	29
32	9.33647	9.98953	10.01047	10.66353	9.34695	10.65305	28
33	9.33704	9.98950	10.01050	10.66296	9.34755	10.65245	27
34	9.33761	9.98947	10.01053	10.66239	9.34814	10.65186	26
35	9.33818	9.98944	10.01056	10.66182	9.34874	10.65126	25
36	9.33874	9.98941	10.01059	10.66126	9.34933	10.65067	24
37	9.33931	9.98938	10.01062	10.66069	9.34992	10.65008	23
38	9.33987	9.98936	10.01064	10.66013	9.35051	10.64949	22
39	9.34043	9.99933	10 01067	10.65957	9.35111	10.64889	21
40	9.34100	9.98930	10.01070	10.65900	9.35170	10.64830	20
41	9.34156	9.98927	10.01073	10.65844	9.35229	10.64771	19
42	9.34212	9.98924	10.01076	10.65788	9.35288	10.64712	18
43	9.34268	9.98921	10.01079	10.65732	9.35347	10.64653	17
44	9.34324	9.98919	10.01081	10.65676	9.35405	10.64595	16
45	9.34380	9.98916	10.01084	10.65620	9.35464	10.64536	15
46	9.34436	9.98913	10.01087	10.65564	9.35523	10.64477	14
47	9.34491	9.98910	10.01090	10.65509	9.35581	10.64419	13
48	9.34547	9 98907	10.01093	10.65453	9.35640	10.64360	12
49	9.34602	9.98904	10.01096	10.65398	9.35698	10.64302	11
50	9.34658	9.98901	10.01099	10.65342	9.35757	10.64243	10
51	9.34713	9.98898	10.01102	10.65287	9.35815	10.64185	9
52	9.34769	9.98896	10.01104	10.65231	9.35873	10.64127	8
53	9.34824	9.98893	10.01107	10.65176	9.35931	10.64069	7
54	9.34879	9.98890	10.01110	10.65121	9.35989	10.64011	6
55	9.34934	9.98887	10.01113	10.65066	9.36047	10.63953	5
56	9.34989	9.98884	10.01116	10.65011	9.36105	10.63895	4
57	9.35044	9.98881	10.01119	10.64956	9.36163	10.63837	3
58	9.35099	9.98878	10.01122	10.64901	9.36221	10.63779	2
59	9.35154	9.98875	10.01125	10.64846	9.36279	10.63721	1
60	9.35209	9.98872	10.01128	10.64791	9.36336	10.63664	0
′	Co-sine	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

13°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.35209	9.98872	10.01128	10.64791	9.36336	10.63664	60
1	9.35263	9.98869	10.01131	10.64737	9.36394	10.63606	59
2	9.35318	9.98867	10.01133	10.64682	9.36452	10.63548	58
3	9.35373	9.98864	10.01136	10.64627	9.36509	10.63491	57
4	9.35427	9.98861	10.01139	10.64573	9.36566	10.63434	56
5	9.35481	9.98858	10.01142	10.64519	9.36624	10.63376	55
6	9.35536	9.98855	10.01145	10.64464	9.36681	10.63319	54
7	9.35590	9.98852	10.01148	10.64410	9.36738	10.63262	53
8	9.35644	9.98849	10.01151	10.64356	9.36795	10.63205	52
9	9.35698	9.98846	10.01154	10.64302	9.36852	10.63148	51
10	9.35752	9.98843	10.01157	10.64248	9.36909	10.63091	50
11	9.35806	9.98840	10.01160	10.64194	9.36966	10.63034	49
12	9.35860	9.98837	10.01163	10.64140	9.37023	10.62977	48
13	9.35914	9.98834	10.01166	10.64086	9.37080	10.62920	47
14	9.35968	9.98831	10.01169	10.64032	9.37137	10.62863	46
15	9.36022	9.98828	10.01172	10.63978	9.37193	10.62807	45
16	9.36075	9.98825	10.01175	10.63925	9.37250	10.62750	44
17	9.36129	9.98822	10.01178	10.63871	9.37306	10.62694	43
18	9.36182	9.98819	10.01181	10.63818	9.37363	10.62637	42
19	9.36236	9.98816	10.01184	10.63764	9.37419	10.62581	41
20	9.36289	9.98813	10.01187	10.63711	9.37476	10.62524	40
21	9.36342	9.98810	10.01190	10.63658	9.37532	10.62468	39
22	9.36395	9.98807	10.01193	10.63605	9.37588	10.62412	38
23	9.36449	9.98804	10.01196	10.63551	9.37644	10.62356	37
24	9.36502	9.98801	10.01199	10.63498	9.37700	10.62300	36
25	9.36555	9.98798	10.01202	10.63445	9.37756	10.62244	35
26	9.36608	9.98795	10.01205	10.63392	9.37812	10.62188	34
27	9.36660	9.98792	10.01208	10.63340	9.37868	10.62132	33
28	9.36713	9.98789	10.01211	10.63287	9.37924	10.62076	32
29	9.36766	9.98786	10.01214	10.63234	9.37980	10.62020	31
30	9.36819	9.98783	10.01217	10.63181	9.38035	10.61965	30
31	9.36871	9.98780	10.01220	10.63129	9.38091	10.61909	29
32	9.36924	9.98777	10.01223	10.63076	9.38147	10.61853	28
33	9.36976	9.98774	10.01226	10.63024	9.38202	10.61798	27
34	9.37028	9.98771	10.01229	10.62972	9.38257	10.61743	26
35	9.37081	9.98768	10.01232	10.62919	9.38313	10.61687	25
36	9.37133	9.98765	10.01235	10.62867	9.38368	10.61632	24
37	9.37185	9.98762	10.01238	10.62815	9.38423	10.61577	23
38	9.37237	9.98759	10.01241	10.62763	9.38479	10.61521	22
39	9.37289	9.98756	10.01244	10.62711	9.38534	10.61466	21
40	9.37341	9.98753	10.01247	10.62659	9.38589	10.61411	20
41	9.37393	9.98750	10.01250	10.62607	9.38644	10.61356	19
42	9.37445	9.98746	10.01254	10.62555	9.38699	10.61301	18
43	9.37497	9.98743	10.01257	10.62503	9.38754	10.61246	17
44	9.37549	9.98740	10.01260	10.62451	9.38808	10.61192	16
45	9.37600	9.98737	10.01263	10.62400	9.38863	10.61137	15
46	9.37652	9.98734	10.01266	10.62348	9.38918	10.61082	14
47	9.37703	9.98731	10.01269	10.62297	9.38972	10.61028	13
48	9.37755	9.98728	10.01272	10.62245	9.39027	10.60973	12
49	9.37806	9.98725	10.01275	10.62194	9.39082	10.60918	11
50	9.37858	9.98722	10.01278	10.62142	9.39136	10.60864	10
51	9.37909	9.98719	10.01281	10.62091	9.39190	10.60810	9
52	9.37960	9.98715	10.01285	10.62040	9.39245	10.60755	8
53	9.38011	9.98712	10.01288	10.61989	9.39299	10.60701	7
54	9.38062	9.98709	10.01291	10.61938	9.39353	10.60647	6
55	9.38113	9.98706	10.01294	10.61887	9.39407	10.60593	5
56	9.38164	9.98703	10.01297	10.61836	9.39461	10.60539	4
57	9.38215	9.98700	10.01300	10.61785	9.39515	10.60485	3
58	9.38266	9.98697	10.01303	10.61734	9.39569	10.60431	2
59	9.38317	9.98694	10.01306	10.61683	9.39623	10.60377	1
60	9.38368	9.98690	10.01310	10.61632	9.39677	10.60323	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

14°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.38368	9.98690	10.01310	10.61632	9.39677	10.60323	60
1	9.38418	9.98687	10.01313	10.61582	9.39731	10.60269	59
2	9.38469	9.98684	10.01316	10.61531	9.39785	10.60215	58
3	9.38519	9.98681	10.01319	10.61481	9.39838	10.60162	57
4	9.38570	9.98678	10.01322	10.61430	9.39892	10.60108	56
5	9.38620	9.98675	10.01325	10.61380	9.39945	10.60055	55
6	9.38670	9.98671	10.01329	10.61330	9.39999	10.60001	54
7	9.38721	9.98668	10.01332	10.61279	9.40052	10.59948	53
8	9.38771	9.98665	10.01335	10.61229	9.40106	10.59894	52
9	9.38821	9.98662	10 01338	10.61179	9.40159	10.59841	51
10	9.38871	9.98659	10.01341	10.61129	9.40212	10.59788	50
11	9.38921	9.98656	10.01344	10.61079	9.40266	10.59734	49
12	9.38971	9.98652	10.01348	10.61029	9.40319	10.59681	48
13	9.39021	9.98649	10 01351	10.60979	9.40372	10.59628	47
14	9.39071	9.98646	10.01354	10.60929	9.40425	10.59575	46
15	9.39121	9.98643	10.01357	10.60879	9.40478	10.59522	45
16	9.39170	9.98640	10.01360	10.60830	9.40531	10.59469	44
17	9.39220	9.98636	10.01364	10.60780	9.40584	10.59416	43
18	9.39270	9.98633	10.01367	10.60730	9.40636	10.59364	42
19	9.39319	9.98630	10.01370	10.60681	9.40689	10.59311	41
20	9.39369	9.98627	10.01373	10.60631	9.40742	10.59258	40
21	9.39418	9.98623	10.01377	10.60582	9.40795	10.59205	39
22	9.39467	9.98620	10 01380	10.60533	9.40847	10.59153	38
23	9.39517	9.98617	10.01383	10.60483	9.40900	10.59100	37
24	9.39566	9.98614	10.01386	10.60434	9.40952	10.59048	36
25	9.39615	9.98610	10.01390	10.60385	9.41005	10.58995	35
26	9.39664	9.98607	10.01393	10.60336	9.41057	10.58943	34
27	9.39713	9.98604	10.01396	10.60287	9.41109	10.58891	33
28	9.39762	9.98601	10 01399	10.60238	9.41161	10.58839	32
29	9.39811	9.98597	10.01403	10.60189	9.41214	10.58786	31
30	9.39860	9.98594	10.01406	10.60140	9.41266	10.58734	30
31	9.39909	9.98591	10.01409	10.60091	9.41318	10.58682	29
32	9.39958	9.98588	10.01412	10.60042	9.41370	10.58630	28
33	9.40006	9.98584	10.01416	10.59994	9 41422	10.58578	27
34	9.40055	9.98581	10.01419	10.59945	9.41474	10.58526	26
35	9.40103	9.98578	10.01422	10.59897	9.41526	10.58474	25
36	9.40152	9.98574	10.01426	10.59848	9.41578	10.58422	24
37	9.40200	9.98571	10.01429	10.59800	9.41629	10.58371	23
38	9.40249	9.98568	10.01432	10.59751	9.41681	10.58319	22
39	9.40297	9.98565	10.01435	10.59703	9.41733	10.58267	21
40	9.40346	9.98561	10.01439	10.59654	9.41784	10.58216	20
41	9.40394	9.98558	10.01442	10.59606	9.41836	10.58164	19
42	9.40442	9.98555	10.01445	10.59558	9.41887	10.58113	18
43	9.40490	9.98551	10.01449	10.59510	9.41939	10.58061	17
44	9.40538	9.98548	10.01452	10.59462	9.41990	10.58010	16
45	9.40586	9.98545	10.01455	10.59414	9.42041	10.57959	15
46	9.40634	9.98541	10.01459	10.59366	9.42093	10.57907	14
47	9.40682	9.98538	10.01462	10.59318	9.42144	10.57856	13
48	9.40730	9.98535	10.01465	10.59270	9.42195	10.57805	12
49	9.40778	9.98531	10.01469	10.59222	9.42246	10.57754	11
50	9.40825	9.98528	10.01472	10.59175	9.42297	10.57703	10
51	9.40873	9.98525	10.01475	10.59127	9.42348	10.57652	9
52	9.40921	9.98521	10.01479	10.59079	9.42399	10.57601	8
53	9.40968	9.98518	10.01482	10.59032	9.42450	10.57550	7
54	9.41016	9.98515	10.01485	10.58984	9.42501	10.57499	6
55	9.41063	9.98511	10.01489	10.58937	9.42552	10.57448	5
56	9.41111	9.98508	10.01492	10.58889	9.42603	10.57397	4
57	9.41158	9.98505	10.01495	10.58842	9.42653	10.57347	3
58	9.41205	9.98501	10.01499	10.58795	9.42704	10.57296	2
59	9.41252	9.98498	10.01502	10.58748	9.42755	10.57245	1
60	9.41300	9.98494	10.01506	10.58700	9.42805	10.57195	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

75°

15°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.41300	9.98494	10.01506	10.58700	9.42805	10.57195	60
1	9.41347	9.98491	10.01509	10.58653	9.42856	10.57144	59
2	9.41394	9.98488	10.01512	10.58606	9.42906	10.57094	58
3	9.41441	9.98484	10.01516	10.58559	9.42957	10.57043	57
4	9.41488	9.98481	10.01519	10.58512	9.43007	10.56993	56
5	9.41535	9.98477	10.01523	10.58465	9.43057	10.56943	55
6	9.41582	9.98474	10.01526	10.58418	9.43108	10.56892	54
7	9.41628	9.98471	10.01529	10.58372	9.43158	10.56842	53
8	9.41675	9.98467	10.01533	10.58325	9.43208	10.56792	52
9	9.41722	9.98464	10.01536	10.58278	9.43258	10.56742	51
10	9.41768	9.98460	10.01540	10.58232	9.43308	10.56692	50
11	9.41815	9.98457	10.01543	10.58185	9.43358	10.56642	49
12	9.41861	9.98453	10.01547	10.58139	9.43408	10.56592	48
13	9.41908	9.98450	10.01550	10.58092	9.43458	10.56542	47
14	9.41954	9.98447	10.01553	10.58046	9.43508	10.56492	46
15	9.42001	9.98443	10.01557	10.57999	9.43558	10.56442	45
16	9.42047	9.98440	10.01560	10.57953	9.43607	10.56393	44
17	9.42093	9.98436	10.01564	10.57907	9.43657	10.56343	43
18	9.42140	9.98433	10.01567	10.57860	9.43707	10.56293	42
19	9.42186	9.98429	10.01571	10.57814	9.43756	10.56244	41
20	9.42232	9.98426	10.01574	10.57768	9.43806	10.56194	40
21	9.42278	9.98422	10.01578	10.57722	9.43855	10.56145	39
22	9.42324	9.98419	10.01581	10.57676	9.43905	10.56095	38
23	9.42370	9.98415	10.01585	10.57630	9.43954	10.56046	37
24	9.42416	9.98412	10.01588	10.57584	9.44004	10.55996	36
25	9.42461	9.98409	10.01591	10.57539	9.44053	10.55947	35
26	9.42507	9.98405	10.01595	10.57493	9.44102	10.55898	34
27	9.42553	9.98402	10.01598	10.57447	9.44151	10.55849	33
28	9.42599	9.98398	10.01602	10.57401	9.44201	10.55799	32
29	9.42644	9.98395	10.01605	10.57356	9.44250	10.55750	31
30	9.42690	9.98391	10.01609	10.57310	9.44299	10.55701	30
31	9.42735	9.98388	10.01612	10.57265	9.44348	10.55652	29
32	9.42781	9.98384	10.01616	10.57219	9.44397	10.55603	28
33	9.42826	9.98381	10.01619	10.57174	9.44446	10.55554	27
34	9.42872	9.98377	10.01623	10.57128	9.44495	10.55505	26
35	9.42917	9.98373	10.01627	10.57083	9.44544	10.55456	25
36	9.42962	9.98370	10.01630	10.57038	9.44592	10.55408	24
37	9.43008	9.98366	10.01634	10.56992	9.44641	10.55359	23
38	9.43053	9.98363	10.01637	10.56947	9.44690	10.55310	22
39	9.43098	9.98359	10.01641	10.56902	9.44738	10.55262	21
40	9.43143	9.98356	10.01644	10.56857	9.44787	10.55213	20
41	9.43188	9.98352	10.01648	10.56812	9.44836	10.55164	19
42	9.43233	9.98349	10.01651	10.56767	9.44884	10.55116	18
43	9.43278	9.98345	10.01655	10.56722	9.44933	10.55067	17
44	9.43323	9.98342	10.01658	10.56677	9.44981	10.55019	16
45	9.43367	9.98338	10.01662	10.56633	9.45029	10.54971	15
46	9.43412	9.98334	10.01666	10.56588	9.45078	10.54922	14
47	9.43457	9.98331	10.01669	10.56543	9.45126	10.54874	13
48	9.43502	9.98327	10.01673	10.56498	9.45174	10.54826	12
49	9.43546	9.98324	10.01676	10.56454	9.45222	10.54778	11
50	9.43591	9.98320	10.01680	10.56409	9.45271	10.54729	10
51	9.43635	9.98317	10.01683	10.56365	9.45319	10.54681	9
52	9.43680	9.98313	10.01687	10.56320	9.45367	10.54633	8
53	9.43724	9.98309	10.01691	10.56276	9.45415	10.54585	7
54	9.43769	9.98306	10.01694	10.56231	9.45463	10.54537	6
55	9.43813	9.98302	10.01698	10.56187	9.45511	10.54489	5
56	9.43857	9.98299	10.01701	10.56143	9.45559	10.54441	4
57	9.43901	9.98295	10.01705	10.56099	9.45606	10.54394	3
58	9.43946	9.98291	10.01709	10.56054	9.45654	10.54346	2
59	9.43990	9.98288	10.01712	10.56010	9.45702	10.54298	1
60	9.44034	9.98284	10.01716	10.55966	9.45750	10.54250	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

74°

16°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.44034	9.98284	10.01716	10.55966	9.45750	10.54250	60
1	9.44078	9.98281	10.01719	10.55922	9.45797	10.54203	59
2	9.44122	9.98277	10.01723	10.55878	9.45845	10.54155	58
3	9.44166	9.98273	10.01727	10.55834	9.45892	10.54108	57
4	9.44210	9.98270	10.01730	10.55790	9.45940	10.54060	56
5	9.44253	9.98266	10.01734	10.55747	9.45987	10.54013	55
6	9.44297	9.98262	10.01738	10.55703	9.46035	10.53965	54
7	9.44341	9.98259	10.01741	10.55659	9.46082	10.53918	53
8	9.44385	9.98255	10.01745	10.55615	9.46130	10.53870	52
9	9.44428	9.98251	10.01749	10.55572	9.46177	10.53823	51
10	9.44472	9.98248	10.01752	10.55528	9.46224	10.53776	50
11	9.44516	9.98244	10.01756	10.55484	9.46271	10.53729	49
12	9.44559	9.98240	10.01760	10.55441	9.46319	10.53681	48
13	9.44602	9.98237	10.01763	10.55398	9.46366	10.53634	47
14	9.44646	9.98233	10.01767	10.55354	9.46413	10.53587	46
15	9.44689	9.98229	10.01771	10.55311	9.46460	10.53540	45
16	9.44733	9.98226	10.01774	10.55267	9.46507	10.53493	44
17	9.44776	9.98222	10.01778	10.55224	9.46554	10.53446	43
18	9.44819	9.98218	10.01782	10.55181	9.46601	10.53399	42
19	9.44862	9.98215	10.01785	10.55138	9.46648	10.53352	41
20	9.44905	9.98211	10.01789	10.55095	9.46694	10.53306	40
21	9.44948	9.98207	10.01793	10.55052	9.46741	10.53259	39
22	9.44992	9.98204	10.01796	10.55008	9.46788	10.53212	38
23	9.45035	9.98200	10.01800	10.54965	9.46835	10.53165	37
24	9.45077	9.98196	10.01804	10.54923	9.46881	10.53119	36
25	9.45120	9.98192	10.01808	10.54880	9.46928	10.53072	35
26	9.45163	9.98189	10.01811	10.54837	9.46975	10.53025	34
27	9.45206	9.98185	10.01815	10.54794	9.47021	10.52979	33
28	9.45249	9.98181	10.01819	10.54751	9.47068	10.52932	32
29	9.45292	9.98177	10.01823	10.54708	9.47114	10.52886	31
30	9.45334	9.98174	10.01826	10.54666	9.47160	10.52840	30
31	9.45377	9.98170	10.01830	10.54623	9.47207	10.52793	29
32	9.45419	9.98166	10.01834	10.54581	9.47253	10.52747	28
33	9.45462	9.98162	10.01838	10.54538	9.47299	10.52701	27
34	9.45504	9.98159	10.01841	10.54496	9.47346	10.52654	26
35	9.45547	9.98155	10.01845	10.54453	9.47392	10.52608	25
36	9.45589	9.98151	10.01849	10.54411	9.47438	10.52562	24
37	9.45632	9.98147	10.01853	10.54368	9.47484	10.52516	23
38	9.45674	9.98144	10.01856	10.54326	9.47530	10.52470	22
39	9.45716	9.98140	10.01860	10.54284	9.47576	10.52424	21
40	9.45758	9.98136	10.01864	10.54242	9.47622	10.52378	20
41	9.45801	9.98132	10.01868	10.54199	9.47668	10.52332	19
42	9.45843	9.98129	10.01871	10.54157	9.47714	10.52286	18
43	9.45885	9.98125	10.01875	10.54115	9.47760	10.52240	17
44	9.45927	9.98121	10.01879	10.54073	9.47806	10.52194	16
45	9.45969	9.98117	10.01883	10.54031	9.47852	10.52148	15
46	9.46011	9.98113	10.01887	10.53989	9.47897	10.52103	14
47	9.46053	9.98110	10.01890	10.53947	9.47943	10.52057	13
48	9.46095	9.98106	10.01894	10.53905	9.47989	10.52011	12
49	9.46136	9.98102	10.01898	10.53864	9.48035	10.51965	11
50	9.46178	9.98098	10.01902	10.53822	9.48080	10.51920	10
51	9.46220	9.98094	10.01906	10.53780	9.48126	10.51874	9
52	9.46262	9.98090	10.01910	10.53738	9.48171	10.51829	8
53	9.46303	9.98087	10.01913	10.53697	9.48217	10.51783	7
54	9.46345	9.98083	10.01917	10.53655	9.48262	10.51738	6
55	9.46386	9.98079	10.01921	10.53614	9.48307	10.51693	5
56	9.46428	9.98075	10.01925	10.53572	9.48353	10.51647	4
57	9.46469	9.98071	10.01929	10.53531	9.48398	10.51602	3
58	9.46511	9.98067	10.01933	10.53489	9.48443	10.51557	2
59	9.46552	9.98063	10.01937	10.53448	9.48489	10.51511	1
60	9.46594	9.98060	10.01940	10.53406	9.48534	10.51466	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

17°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.46594	9.98060	10.01940	10.53406	9.48534	10.51466	60
1	9.46635	9.98056	10.01944	10.53365	9.48579	10.51421	59
2	9.46676	9.98052	10.01948	10.53324	9.48624	10.51376	58
3	9.46717	9.98048	10.01952	10.53283	9.48669	10.51331	57
4	9.46758	9.98044	10.01956	10.53242	9.48714	10.51286	56
5	9.46800	9.98040	10.01960	10.53200	9.48759	10.51241	55
6	9.46841	9.98036	10.01964	10.53159	9.48804	10.51196	54
7	9.46882	9.98032	10.01968	10.53118	9.48849	10.51151	53
8	9.46923	9.98029	10.01971	10.53077	9.48894	10.51106	52
9	9.46964	9.98025	10.01975	10.53036	9.48939	10.51061	51
10	9.47005	9.98021	10.01979	10.52995	9.48984	10.51016	50
11	9.47045	9.98017	10.01983	10.52955	9.49029	10.50971	49
12	9.47086	9.98013	10.01987	10.52914	9.49073	10.50927	48
13	9.47127	9.98009	10.01991	10.52873	9.49118	10.50882	47
14	9.47168	9.98005	10.01995	10.52832	9.49163	10.50837	46
15	9.47209	9.98001	10.01999	10.52791	9.49207	10.50793	45
16	9.47249	9.97997	10.02003	10.52751	9.49252	10.50748	44
17	9.47290	9.97993	10.02007	10.52710	9.49296	10.50704	43
18	9.47330	9.97989	10.02011	10.52670	9.49341	10.50659	42
19	9.47371	9.97986	10.02014	10.52629	9.49385	10.50615	41
20	9.47411	9.97982	10.02018	10.52589	9.49430	10.50570	40
21	9.47452	9.97978	10.02022	10.52548	9.49474	10.50526	39
22	9.47492	9.97974	10.02026	10.52508	9.49519	10.50481	38
23	9.47533	9.97970	10.02030	10.52467	9.49563	10.50437	37
24	9.47573	9.97966	10.02034	10.52427	9.49607	10.50393	36
25	9.47613	9.97962	10.02038	10.52387	9.49652	10.50348	35
26	9.47654	9.97958	10.02042	10.52346	9.49696	10.50304	34
27	9.47694	9.97954	10.02046	10.52306	9.49740	10.50260	33
28	9.47734	9.97950	10.02050	10.52266	9.49784	10.50216	32
29	9.47774	9.97946	10.02054	10.52226	9.49828	10.50172	31
30	9.47814	9.97942	10.02058	10.52186	9.49872	10.50128	30
31	9.47854	9.97938	10.02062	10.52146	9.49916	10.50084	29
32	9.47894	9.97934	10.02066	10.52106	9.49960	10.50040	28
33	9.47934	9.97930	10.02070	10.52066	9.50004	10.49996	27
34	9.47974	9.97926	10.02074	10.52026	9.50048	10.49952	26
35	9.48014	9.97922	10.02078	10.51986	9.50092	10.49908	25
36	9.48054	9.97918	10.02082	10.51946	9.50136	10.49864	24
37	9.48094	9.97914	10.02086	10.51906	9.50180	10.49820	23
38	9.48133	9.97910	10.02090	10.51867	9.50223	10.49777	22
39	9.48173	9.97906	10.02094	10.51827	9.50267	10.49733	21
40	9.48213	9.97902	10.02098	10.51787	9.50311	10.49689	20
41	9.48252	9.97898	10.02102	10.51748	9.50355	10.49645	19
42	9.48292	9.97894	10.02106	10.51708	9.50398	10.49602	18
43	9.48332	9.97890	10.02110	10.51668	9.50442	10.49558	17
44	9.48371	9.97886	10.02114	10.51629	9.50485	10.49515	16
45	9.48411	9.97882	10.02118	10.51589	9.50529	10.49471	15
46	9.48450	9.97878	10.02122	10.51550	9.50572	10.49428	14
47	9.48490	9.97874	10.02126	10.51510	9.50616	10.49384	13
48	9.48529	9.97870	10.02130	10.51471	9.50659	10.49341	12
49	9.48568	9.97866	10.02134	10.51432	9.50703	10.49297	11
50	9.48607	9.97861	10.02139	10.51393	9.50746	10.49254	10
51	9.48647	9.97857	10.02143	10.51353	9.50789	10.49211	9
52	9.48686	9.97853	10.02147	10.51314	9.50833	10.49167	8
53	9.48725	9.97849	10.02151	10.51275	9.50876	10.49124	7
54	9.48764	9.97845	10.02155	10.51236	9.50919	10.49081	6
55	9.48803	9.97841	10.02159	10.51197	9.50962	10.49038	5
56	9.48842	9.97837	10.02163	10.51158	9.51005	10.48995	4
57	9.48881	9.97833	10.02167	10.51119	9.51048	10.48952	3
58	9.48920	9.97829	10.02171	10.51080	9.51092	10.48908	2
59	9.48959	9.97825	10.02175	10.51041	9.51135	10.48865	1
60	9.48998	9.97821	10.02179	10.51002	9.51178	10.48822	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

72°

18°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.48998	9.97821	10.02179	10.51002	9.51178	10.48822	60
1	9.49037	9.97817	10.02183	10.50963	9.51221	10.48779	59
2	9.49076	9.97812	10.02188	10.50924	9.51264	10.48736	58
3	9.49115	9.97808	10.02192	10.50885	9.51306	10.48694	57
4	9.49153	9.97804	10.02196	10.50847	9.51349	10.48651	56
5	9.49192	9.97800	10.02200	10.50808	9.51392	10.48608	55
6	9.49231	9.97796	10.02204	10.50769	9.51435	10.48565	54
7	9.49269	9.97792	10.02208	10.50731	9.51478	10.48522	53
8	9.49308	9.97788	10.02212	10.50692	9.51520	10.48480	52
9	9.49347	9.97784	10.02216	10.50653	9.51563	10.48437	51
10	9.49385	9.97779	10.02221	10.50615	9.51606	10.48394	50
11	9.49424	9.97775	10.02225	10.50576	9.51648	10.48352	49
12	9.49462	9.97771	10.02229	10.50538	9.51691	10.48309	48
13	9.49500	9.97767	10.02233	10.50500	9.51734	10.48266	47
14	9.49539	9.97763	10.02237	10.50461	9.51776	10.48224	46
15	9.49577	9.97759	10.02241	10.50423	9.51819	10.48181	45
16	9.49615	9.97754	10.02246	10.50385	9.51861	10.48139	44
17	9.49654	9.97750	10.02250	10.50346	9.51903	10.48097	43
18	9.49692	9.97746	10.02254	10.50308	9.51946	10.48054	42
19	9.49730	9.97742	10.02258	10.50270	9.51988	10.48012	41
20	9.49768	9.97738	10.02262	10.50232	9.52031	10.47969	40
21	9.49806	9.97734	10.02266	10.50194	9.52073	10.47927	39
22	9.49844	9.97729	10.02271	10.50156	9.52115	10.47885	38
23	9.49882	9.97725	10.02275	10.50118	9.52157	10.47843	37
24	9.49920	9.97721	10.02279	10.50080	9.52200	10.47800	36
25	9.49958	9.97717	10.02283	10.50042	9.52242	10.47758	35
26	9.49996	9.97713	10.02287	10.50004	9.52284	10.47716	34
27	9.50034	9.97708	10.02292	10.49966	9.52326	10.47674	33
28	9.50072	9.97704	10.02296	10.49928	9.52368	10.47632	32
29	9.50110	9.97700	10.02300	10.49890	9.52410	10.47590	31
30	9.50148	9.97696	10.02304	10.49852	9.52452	10.47548	30
31	9.50185	9.97691	10.02309	10.49815	9.52494	10.47506	29
32	9.50223	9.97687	10.02313	10.49777	9.52536	10.47464	28
33	9.50261	9.97683	10.02317	10.49739	9.52578	10.47422	27
34	9.50298	9.97679	10.02321	10.49702	9.52620	10.47380	26
35	9.50336	9.97674	10.02326	10.49664	9.52661	10.47339	25
36	9.50374	9.97670	10.02330	10.49626	9.52703	10,47297	24
37	9.50411	9.97666	10.02334	10.49589	9.52745	10.47255	23
38	9.50449	9.97662	10.02338	10.49551	9.52787	10.47213	22
39	9.50486	9.97657	10.02343	10.49514	9.52829	10.47171	21
40	9.50523	9.97653	10.02347	10.49477	9.52870	10.47130	20
41	9.50561	9.97649	10.02351	10.49439	9.52912	10.47088	19
42	9.50598	9.97645	10.02355	10.49402	9.52953	10.47047	18
43	9.50635	9.97640	10.02360	10.49365	9.52995	10.47005	17
44	9.50673	9.97636	10.02364	10.49327	9.53037	10.46963	16
45	9.50710	9.97632	10.02368	10.49290	9.53078	10.46922	15
46	9.50747	9.97628	10.02372	10.49253	9.53120	10.46880	14
47	9.50784	9.97623	10.02377	10.49216	9.53161	10.46839	13
48	9.50821	9.97619	10.02381	10.49179	9.53202	10.46798	12
49	9.50858	9.97615	10.02385	10.49142	9.53244	10.46756	11
50	9.50896	9.97610	10.02390	10.49104	9.53285	10.46715	10
51	9.50933	9.97606	10.02394	10.49067	9.53327	10.46673	9
52	9.50970	9.97602	10.02398	10.49030	9.53368	10.46632	8
53	9.51007	9.97597	10.02403	10.48993	9.53409	10.46591	7
54	9.51043	9.97593	10.02407	10.48957	9.53450	10.46550	6
55	9.51080	9.97589	10.02411	10.48920	9.53492	10.46508	5
56	9.51117	9.97584	10.02416	10.48883	9.53533	10.46467	4
57	9.51154	9.97580	10.02420	10.48846	9.53574	10.46426	3
58	9.51191	9.97576	10.02424	10.48809	9.53615	10.46385	2
59	9.51227	9.97571	10.02429	10.48773	9.53656	10.46344	1
60	9.51264	9.97567	10.02433	10.48736	9.53697	10.46303	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

71°

19°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.51264	9.97567	10.02433	10.48736	9.53697	10.46303	60
1	9.51301	9.97563	10.02437	10.48699	9.53738	10.46262	59
2	9.51338	9.97558	10.02442	10.48662	9.53779	10.46221	58
3	9.51374	9.97554	10.02446	10.48626	9.53820	10.46180	57
4	9.51411	9.97550	10.02450	10.48589	9.53861	10.46139	56
5	9.51447	9.97545	10.02455	10.48553	9.53902	10.46098	55
6	9.51484	9.97541	10.02459	10.48516	9.53943	10.46057	54
7	9.51520	9.97536	10.02464	10.48480	9.53984	10.46016	53
8	9.51557	9.97532	10.02468	10.48443	9.54025	10.45975	52
9	9.51593	9.97528	10.02472	10.48407	9.54065	10.45935	51
10	9.51629	9.97523	10.02477	10.48371	9.54106	10.45894	50
11	9.51666	9.97519	10.02481	10.48334	9.54147	10.45853	49
12	9.51702	9.97515	10.02485	10.48298	9.54187	10.45813	48
13	9.51738	9.97510	10.02490	10.48262	9.54228	10.45772	47
14	9.51774	9.97506	10.02494	10.48226	9.54269	10.45731	46
15	9.51811	9.97501	10.02499	10.48189	9.54309	10.45691	45
16	9.51847	9.97497	10.02503	10.48153	9.54350	10.45650	44
17	9.51883	9.97492	10.02508	10.48117	9.54390	10.45610	43
18	9.51919	9.97488	10.02512	10.48081	9.54431	10.45569	42
19	9.51955	9.97484	10.02516	10.48045	9.54471	10.45529	41
20	9.51991	9.97479	10.02521	10.48009	9.54512	10.45488	40
21	9.52027	9.97475	10.02525	10.47973	9.54552	10.45448	39
22	9.52063	9.97470	10.02530	10.47937	9.54593	10.45407	38
23	9.52099	9.97466	10.02534	10.47901	9.54633	10.45367	37
24	9.52135	9.97461	10.02539	10.47865	9.54673	10.45327	36
25	9.52171	9.97457	10.02543	10.47829	9.54714	10.45286	35
26	9.52207	9.97453	10.02547	10.47793	9.54754	10.45246	34
27	9.52242	9.97448	10.02552	10.47758	9.54794	10.45206	33
28	9.52278	9.97444	10.02556	10.47722	9.54835	10.45165	32
29	9.52314	9.97439	10.02561	10.47686	9.54875	10.45125	31
30	9.52350	9.97435	10.02565	10.47650	9.54915	10.45085	30
31	9.52385	9.97430	10.02570	10.47615	9.54955	10.45045	29
32	9.52421	9.97426	10.02574	10.47579	9.54995	10.45005	28
33	9.52456	9.97421	10.02579	10.47544	9.55035	10.44965	27
34	9.52492	9.97417	10.02583	10.47508	9.55075	10.44925	26
35	9.52527	9.97412	10.02588	10.47473	9.55115	10.44885	25
36	9.52563	9.97408	10.02592	10.47437	9.55155	10.44845	24
37	9.52598	9.97403	10.02597	10.47402	9.55195	10.44805	23
38	9.52634	9.97399	10.02601	10.47366	9.55235	10.44765	22
39	9.52669	9.97394	10.02606	10.47331	9.55275	10.44725	21
40	9.52705	9.97390	10.02610	10.47295	9.55315	10.44685	20
41	9.52740	9.97385	10.02615	10.47260	9.55355	10.44645	19
42	9.52775	9.97381	10.02619	10.47225	9.55395	10.44605	18
43	9.52811	9.97376	10.02624	10.47189	9.55434	10.44566	17
44	9.52846	9.97372	10.02628	10.47154	9.55474	10.44526	16
45	9.52881	9.97367	10.02633	10.47119	9.55514	10.44486	15
46	9.52916	9.97363	10.02637	10.47084	9.55554	10.44446	14
47	9.52951	9.97358	10.02642	10.47049	9.55593	10.44407	13
48	9.52986	9.97353	10.02647	10.47014	9.55633	10.44367	12
49	9.53021	9.97349	10.02651	10.46979	9.55673	10.44327	11
50	9.53056	9.97344	10.02656	10.46944	9.55712	10.44288	10
51	9.53092	9.97340	10.02660	10.46908	9.55752	10.44248	9
52	9.53126	9.97335	10.02665	10.46874	9.55791	10.44209	8
53	9.53161	9.97331	10.02669	10.46839	9.55831	10.44169	7
54	9.53196	9.97326	10.02674	10.46804	9.55870	10.44130	6
55	9.53231	9 97322	10.02678	10.46769	9.55910	10.44090	5
56	9.53266	9.97317	10.02683	10.46734	9.55949	10.44051	4
57	9.53301	9.97312	10.02688	10.46699	9.55989	10.44011	3
58	9.53336	9.97308	10.02692	10.46664	9.56028	10.43972	2
59	9.53370	9.97303	10.02697	10.46630	9.56067	10.43933	1
60	9.53405	9.97299	10.02701	10.46595	9.56107	10.43893	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

70°

20°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.53405	9.97299	10.02701	10.46595	9.56107	10.43893	60
1	9.53440	9.97294	10.02706	10.46560	9.56146	10.43854	59
2	9.53475	9.97289	10.02711	10.46525	9.56185	10.43815	58
3	9.53509	9.97285	10.02715	10.46491	9.56224	10.43776	57
4	9.53544	9.97280	10.02720	10.46456	9.56264	10.43736	56
5	9.53578	9.97276	10.02724	10.46422	9.56303	10.43697	55
6	9.53613	9.97271	10.02729	10.46387	9.56342	10.43658	54
7	9.53647	9.97266	10.02734	10.46353	9.56381	10.43619	53
8	9.53682	9.97262	10.02738	10.46318	9.56420	10.43580	52
9	9.53716	9.97257	10.02743	10.46284	9.56459	10.43541	51
10	9.53751	9.97252	10.02748	10.46249	9.56498	10.43502	50
11	9.53785	9.97248	10.02752	10.46215	9.56537	10.43463	49
12	9.53819	9.97243	10.02757	10.46181	9.56576	10.43424	48
13	9.53854	9.97238	10.02762	10.46146	9.56615	10.43385	47
14	9.53888	9.97234	10.02766	10.46112	9.56654	10.43346	46
15	9.53922	9.97229	10.02771	10.46078	9.56693	10.43307	45
16	9.53957	9.97224	10.02776	10.46043	9.56732	10.43268	44
17	9.53991	9.97220	10.02780	10.46009	9.56771	10.43229	43
18	9.54025	9.97215	10.02785	10.45975	9.56810	10.43190	42
19	9.54059	9.97210	10.02790	10.45941	9.56849	10.43151	41
20	9.54093	9.97206	10.02794	10.45907	9.56887	10.43113	40
21	9.54127	9.97201	10.02799	10.45873	9.56926	10.43074	39
22	9.54161	9.97196	10.02804	10.45839	9.56965	10.43035	38
23	9 54195	9.97192	10.02808	10.45805	9.57004	10.42996	37
24	9.54229	9.97187	10.02813	10.45771	9.57042	10.42958	36
25	9.54263	9.97182	10.02818	10.45737	9.57081	10.42919	35
26	9.54297	9.97178	10.02822	10.45703	9.57120	10.42880	34
27	9.54331	9.97173	10.02827	10.45669	9.57158	10.42842	33
28	9.54365	9.97168	10.02832	10.45635	9.57197	10.42803	32
29	9.54399	9.97163	10.02837	10.45601	9.57235	10.42765	31
30	9.54433	9.97159	10.02841	10.45567	9.57274	10.42726	30
31	9.54466	9.97154	10.02846	10.45534	9.57312	10.42688	29
32	9.54500	9.97149	10.02851	10.45500	9.57351	10.42649	28
33	9.54534	9.97145	10.02855	10.45466	9.57389	10.42611	27
34	9.54567	9.97140	10.02860	10.45433	9.57428	10.42572	26
35	9.54601	9.97135	10.02865	10.45399	9.57466	10.42534	25
36	9.54635	9.97130	10.02870	10.45365	9.57504	10.42496	24
37	9.54668	9.97126	10.02874	10.45332	9.57543	10.42457	23
38	9.54702	9.97121	10.02879	10.45298	9.57581	10.42419	22
39	9.54735	9.97116	10.02884	10.45265	9.57619	10.42381	21
40	9.54769	9.97111	10 02889	10.45231	9.57658	10.42342	20
41	9.54802	9.97107	10.02893	10.45198	9.57696	10.42304	19
42	9.54836	9.97102	10.02898	10.45164	9.57734	10.42266	18
43	9.54869	9.97097	10.02903	10.45131	9.57772	10.42228	17
44	9.54903	9.97092	10.02908	10.45097	9.57810	10.42190	16
45	9.54936	9.97087	10.02913	10.45064	9.57849	10.42151	15
46	9.54969	9.97083	10.02917	10.45031	9.57887	10.42113	14
47	9.55003	9.97078	10.02922	10.44997	9.57925	10.42075	13
48	9.55036	9.97073	10.02927	10.44964	9.57963	10.42037	12
49	9.55069	9.97068	10.02932	10.44931	9.58001	10.41999	11
50	9.55102	9.97063	10.02937	10.44898	9.58039	10.41961	10
51	9.55136	9.97059	10.02941	10.44864	9.58077	10.41923	9
52	9.55169	9.97054	10.02946	10.44831	9.58115	10.41885	8
53	9.55202	9.97049	10.02951	10.44798	9.58153	10.41847	7
54	9.55235	9.97044	10.02956	10.44765	9.58191	10.41809	6
55	9.55268	9.97039	10.02961	10.44732	9.58229	10.41771	5
56	9.55301	9.97035	10.02965	10.44699	9.58267	10.41733	4
57	9.55334	9.97030	10.02970	10.44666	9.58304	10.41696	3
58	9.55367	9.97025	10.02975	10.44633	9.58342	10.41658	2
59	9.55400	9.97020	10.02980	10.44600	9.58380	10.41620	1
60	9.55433	9.97015	10.02985	10.44567	9.58418	10.41582	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

21°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.55433	9.97015	10.02985	10.44567	9.58418	10.41582	60
1	9.55466	9.97010	10.02990	10.44534	9.58455	10.41545	59
2	9.55499	9.97005	10.02995	10.44501	9.58493	10.41507	58
3	9.55532	9.97001	10.02999	10.44468	9.58531	10.41469	57
4	9.55564	9.96996	10.03004	10.44436	9.58569	10.41431	56
5	9.55597	9.96991	10.03009	10.44403	9.58606	10.41394	55
6	9.55630	9.96986	10.03014	10.44370	9.58644	10.41356	54
7	9.55663	9.96981	10.03019	10.44337	9.58681	10.41319	53
8	9.55695	9.97976	10.03024	10.44305	9.58719	10.41281	52
9	9.55728	9.96971	10.03029	10.44272	9.58757	10.41243	51
10	9.55761	9.96966	10.03034	10.44239	9.58794	10.41206	50
11	9.55793	9.96962	10.03038	10.44207	9.58832	10.41168	49
12	9.55826	9.96957	10.03043	10.44174	9.58869	10.41131	48
13	9.55858	9.96952	10 03048	10.44142	9.58907	10.41093	47
14	9.55891	9.96947	10.03053	10.44109	9.58944	10.41056	46
15	9.55923	9.96942	10.03058	10.44077	9.58981	10.41019	45
16	9.55956	9.96937	10.03063	10.44044	9.59019	10.40981	44
17	9.55988	9.96932	10.03068	10.44012	9.59056	10.40944	43
18	9.56021	9.96927	10.03073	10.43979	9.59094	10.40906	42
19	9.56053	9.96922	10.03078	10.43947	9.59131	10.40869	41
20	9.56085	9.96917	10.03083	10.43915	9.59168	10.40832	40
21	9.56118	9.96912	10.03088	10.43882	9.59205	10.40795	39
22	9.56150	9.96907	10.03093	10.43850	9.59243	10.40757	38
23	9.56182	9.96903	10.03097	10.43818	9.59280	10.40720	37
24	9.56215	9.96898	10.03102	10.43785	9.59317	10.40683	36
25	9.56247	9.96893	10.03107	10.43753	9.59354	10.40646	35
26	9.56279	9.96888	10.03112	10.43721	9.59391	10.40609	34
27	9.56311	9.96883	10.03117	10.43689	9.59429	10.40571	33
28	9.56343	9.96878	10.03122	10.43657	9.59466	10.40534	32
29	9.56375	9.96873	10.03127	10.43625	9.59503	10.40497	31
30	9.56408	9.96868	10.03132	10.43592	9.59540	10.40460	30
31	9.56440	9.96863	10.03137	10.43560	9.59577	10.40423	29
32	9.56472	9.96858	10.03142	10.43528	9.59614	10.40386	28
33	9.56504	9.96853	10.03147	10.43496	9.59651	10.40349	27
34	9.56536	9.96848	10.03152	10.43464	9.59688	10.40312	26
35	9.56568	9.96843	10.03157	10.43432	9.59725	10.40275	25
36	9.56599	9.96838	10.03162	10.43401	9.59762	10.40238	24
37	9.56631	9.96833	10.03167	10.43369	9.59799	10.40201	23
38	9.56663	9.96828	10.03172	10.43337	9.59835	10.40165	22
39	9.56695	9.96823	10.03177	10.43305	9.59872	10.40128	21
40	9.56727	9.96818	10.03182	10.43273	9.59909	10.40091	20
41	9.56759	9.96813	10.03187	10.43241	9.59946	10.40054	19
42	9.56790	9.96808	10.03192	10.43210	9.59983	10.40017	18
43	9.56822	9.96803	10.03197	10.43178	9.60019	10.39981	17
44	9.56854	9.96798	10.03202	10.43146	9.60056	10.39944	16
45	9.56886	9.96793	10.03207	10.43114	9.60093	10.39907	15
46	9.56917	9.96788	10.03212	10.43083	9.60130	10.39870	14
47	9.56949	9.96783	10.03217	10.43051	9.60166	10.39834	13
48	9.56980	9.96778	10.03222	10.43020	9.60203	10.39797	12
49	9.57012	9.96772	10.03228	10.42988	9.60240	10.39760	11
50	9.57044	9.96767	10.03233	10.42956	9.60276	10.39724	10
51	9.57075	9.96762	10.03238	10.42925	9.60313	10.39687	9
52	9.57107	9.96757	10.03243	10.42893	9.60349	10.39651	8
53	9.57138	9.96752	10.03248	10.42862	9.60386	10.39614	7
54	9.57169	9.96747	10.03253	10.42831	9.60422	10.39578	6
55	9.57201	9.96742	10.03258	10.42799	9.60459	10.39541	5
56	9.57232	9.96737	10.03263	10.42768	9.60495	10.39505	4
57	9.57264	9.96732	10.03268	10.42736	9.60532	10.39468	3
58	9.57295	9.96727	10.03273	10.42705	9.60568	10.39432	2
59	9.57326	9.96722	10.03278	10.42674	9.60605	10.39395	1
60	9.57358	9.96717	10.03283	10.42642	9.60641	10.39359	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

22°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.57358	9.96717	10.03283	10.42642	9.60641	10.39359	60
1	9.57389	9.96711	10.03289	10.42611	9.60677	10.39323	59
2	9.57420	9.96706	10.03294	10.42580	9.60714	10.39286	58
3	9.57451	9.96701	10.03299	10.42549	9.60750	10.39250	57
4	9.57482	9.96696	10.03304	10.42518	9.60786	10.39214	56
5	9.57514	9.96691	10.03309	10.42486	9.60823	10.39177	55
6	9.57545	9.96686	10.03314	10.42455	9.60859	10.39141	54
7	9.57576	9.96681	10.03319	10.42424	9.60895	10.39105	53
8	9.57607	9.96676	10.03324	10.42393	9.60931	10.39069	52
9	9.57638	9.96670	10.03330	10.42362	9.60967	10.39033	51
10	9.57669	9.96665	10.03335	10.42331	9.61004	10.38996	50
11	9.57700	9.96660	10.03340	10.42300	9.61040	10.38960	49
12	9.57731	9.96655	10.03345	10.42269	9.61076	10.38924	48
13	9.57762	9.96650	10.03350	10.42238	9.61112	10.38888	47
14	9.57793	9.96645	10.03355	10.42207	9.61148	10.38852	46
15	9.57824	9.96640	10.03360	10.42176	9.61184	10.38816	45
16	9.57855	9.96634	10.03366	10.42145	9.61220	10.38780	44
17	9.57885	9.96629	10.03371	10.42115	9.61256	10.38744	43
18	9.57916	9.96624	10.03376	10.42084	9.61292	10.38708	42
19	9.57947	9.96619	10.03381	10.42053	9.61328	10.38672	41
20	9.57978	9.96614	10.03386	10.42022	9.61364	10.38636	40
21	9.58008	9.96608	10.03392	10.41992	9.61400	10.38600	39
22	9.58039	9.96603	10.03397	10.41961	9.61436	10.38564	38
23	9.58070	9.96598	10.03402	10.41930	9.61472	10.38528	37
24	9.58101	9.96593	10.03407	10.41899	9.61508	10.38492	36
25	9.58131	9.96588	10.03412	10.41869	9.61544	10.38456	35
26	9.58162	9.96582	10.03418	10.41838	9.61579	10.38421	34
27	9.58192	9.96577	10.03423	10.41808	9.61615	10.38385	33
28	9.58223	9.96572	10.03428	10.41777	9.61651	10.38349	32
29	9.58253	9.96567	10.03433	10.41747	9.61687	10.38313	31
30	9.58284	9.96562	10.03438	10.41716	9.61722	10.38278	30
31	9.58314	9.96556	10.03444	10.41686	9.61758	10.38242	29
32	9.58345	9.96551	10.03449	10.41655	9.61794	10.38206	28
33	9.58375	9.96546	10.03454	10.41625	9.61830	10.38170	27
34	9.58406	9.96541	10.03459	10.41594	9.61865	10.38135	26
35	9.58436	9.96535	10.03465	10.41564	9.61901	10.38099	25
36	9.58467	9.96530	10.03470	10.41533	9.61936	10.38064	24
37	9.58497	9.96525	10.03475	10.41503	9.61972	10.38028	23
38	9.58527	9.96520	10.03480	10.41473	9.62008	10.37992	22
39	9.58557	9.96514	10.03486	10.41443	9.62043	10.37957	21
40	9.58588	9.96509	10.03491	10.41412	9.62079	10.37921	20
41	9.58618	9.96504	10.03496	10.41382	9.62114	10.37886	19
42	9.58648	9.96498	10.03502	10.41352	9.62150	10.37850	18
43	9.58678	9.96493	10.03507	10.41322	9.62185	10.37815	17
44	9.58709	9.96488	10.03512	10.41291	9.62221	10.37779	16
45	9.58739	9.96483	10.03517	10.41261	9.62256	10.37744	15
46	9.58769	9.96477	10.03523	10.41231	9.62292	10.37708	14
47	9.58799	9.96472	10.03528	10.41201	9.62327	10.37673	13
48	9.58829	9.96467	10.03533	10.41171	9.62362	10.37638	12
49	9.58859	9.96461	10.03539	10.41141	9.62398	10.37602	11
50	9.58889	9.96456	10.03544	10.41111	9.62433	10.37567	10
51	9.58919	9.96451	10.03549	10.41081	9.62468	10.37532	9
52	9.58949	9.96445	10.03555	10.41051	9.62504	10.37496	8
53	9.58979	9.96440	10.03560	10.41021	9.62539	10.37461	7
54	9.59009	9.96435	10.03565	10.40991	9.62574	10.37426	6
55	9.59039	9.96429	10.03571	10.40961	9.62609	10.37391	5
56	9.59069	9.96424	10.03576	10.40931	9.62645	10.37355	4
57	9.59098	9.96419	10.03581	10.40902	9.62680	10.37320	3
58	9.59128	9.96413	10.03587	10.40872	9.62715	10.37285	2
59	9.59158	9.96408	10.03592	10.40842	9.62750	10.37250	1
60	9.59188	9.96403	10.03597	10.40812	9.62785	10.37215	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

23°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.59188	9.96403	10.03597	10.40812	9.62785	10.37215	60
1	9.59218	9.96397	10.03603	10.40782	9.62820	10.37180	59
2	9.59247	9.96392	10.03608	10.40753	9.62855	10.37145	58
3	9.59277	9.96387	10.03613	10.40723	9.62890	10.37110	57
4	9.59307	9.96381	10.03619	10.40693	9.62926	10.37074	56
5	9.59336	9.96376	10.03624	10.40664	9.62961	10.37039	55
6	9.59366	9.96370	10.03630	10.40634	9.62996	10.37004	54
7	9.59396	9.96365	10.03635	10.40604	9.63031	10.36969	53
8	9.59425	9.96360	10.03640	10.40575	9.63066	10.36934	52
9	9.59455	9.96354	10.03646	10.40545	9.63101	10.36899	51
10	9.59484	9.96349	10.03651	10.40516	9.63135	10.36865	50
11	9.59514	9.96343	10.03657	10.40486	9.63170	10.36830	49
12	9.59543	9.96338	10.03662	10.40457	9.63205	10.36795	48
13	9.59573	9.96333	10.03667	10.40427	9.63240	10.36760	47
14	9.59602	9.96327	10.03673	10.40398	9.63275	10.36725	46
15	9.59632	9.96322	10.03678	10.40368	9.63310	10.36690	45
16	9.59661	9.96316	10.03684	10.40339	9.63345	10.36655	44
17	9.59690	9.96311	10.03689	10.40310	9.63379	10.36621	43
18	9.59720	9.96305	10.03695	10.40280	9.63414	10.36586	42
19	9.59749	9.96300	10.03700	10.40251	9.63449	10.36551	41
20	9.59778	9.96294	10.03706	10.40222	9.63484	10.36516	40
21	9.59808	9.96289	10.03711	10.40192	9.63519	10.36481	39
22	9.59837	9.96284	10.03716	10.40163	9.63553	10.36447	38
23	9.59866	9.96278	10.03722	10.40134	9.63588	10.36412	37
24	9.59895	9.96273	10.03727	10.40105	9.63623	10.36377	36
25	9.59924	9.96267	10.03733	10.40076	9.63657	10.36343	35
26	9.59954	9.96262	10.03738	10.40046	9.63692	10.36308	34
27	9.59983	9.96256	10.03744	10.40017	9.63726	10.36274	33
28	9.60012	9.96251	10.03749	10.39988	9.63761	10.36239	32
29	9.60041	9.96245	10.03755	10.39959	9.63796	10.36204	31
30	9.60070	9.96240	10.03760	10.39930	9.63830	10.36170	30
31	9.60099	9.96234	10.03766	10.39901	9.63865	10.36135	29
32	9.60128	9.96229	10.03771	10.39872	9.63899	10.36101	28
33	9.60157	9 96223	10.03777	10.39843	9.63934	10.36066	27
34	9.60186	9.96218	10.03782	10.39814	9.63968	10.36032	26
35	9.60215	9.96212	10.03788	10.39785	9.64003	10.35997	25
36	9.60244	9.96207	10.03793	10.39756	9.64037	10.35963	24
37	9.60273	9.96201	10.03799	10.39727	9.64072	10.35928	23
38	9.60302	9.96196	10.03804	10.39698	9.64106	10.35894	22
39	9.60331	9.96190	10.03810	10.39669	9.64140	10.35860	21
40	9.60359	9.96185	10.03815	10.39641	9.64175	10.35825	20
41	9.60388	9.96179	10.03821	10.39612	9.64209	10.35791	19
42	9.60417	9.96174	10.03826	10.39583	9.64243	10.35757	18
43	9.60446	9.96168	10.03832	10.39554	9.64278	10.35722	17
44	9.60474	9.96162	10.03838	10.39526	9.64312	10.35688	16
45	9.60503	9.96157	10.03843	10.39497	9.64346	10.35654	15
46	9.60532	9.96151	10.03849	10.39468	9.64381	10.35619	14
47	9.60561	9.96146	10.03854	10.39439	9.64415	10.35585	13
48	9.60589	9.96140	10 03860	10.39411	9.64449	10.35551	12
49	9.60618	9.96135	10.03865	10.39382	9.64483	10.35517	11
50	9.60646	9.96129	10.03871	10.39354	9.64517	10.35483	10
51	9.60675	9.96123	10.03877	10.39325	9.64552	10.35448	9
52	9.60704	9.96118	10.03882	10.39296	9.64586	10.35414	8
53	9.60732	9.96112	10.03888	10.39268	9.64620	10.35380	7
54	9.60761	9.96107	10.03893	10.39239	9.64654	10.35346	6
55	9.60789	9.96101	10.03899	10.39211	9.64688	10.35312	5
56	9.60818	9.96095	10.03905	10.39182	9.64722	10.35278	4
57	9.60846	9.96090	10.03910	10.39154	9.64756	10.35244	3
58	9.60875	9.96084	10.03916	10.39125	9.64790	10.35210	2
59	9.60903	9.96079	10.03921	10.39097	9.64824	10.35176	1
60	9.60931	9.96073	10.03927	10.39069	9.64858	10.35142	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

66°

24°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.60931	9.96073	10.03927	10.39069	9.64858	10.35142	60
1	9.60960	9.96067	10.03933	10.39040	9.64892	10.35108	59
2	9.60988	9.96062	10.03938	10.39012	9.64926	10.35074	58
3	9.61016	9.96056	10.03944	10.38984	9.64960	10.35040	57
4	9.61045	9.96050	10.03950	10.38955	9.64994	10.35006	56
5	9.61073	9.96045	10.03955	10.38927	9.65028	10.34972	55
6	9.61101	9.96039	10.03961	10.38899	9.65062	10.34938	54
7	9.61129	9.96034	10.03966	10.38871	9.65096	10.34904	53
8	9.61158	9.96028	10.03972	10.38842	9.65130	10.34870	52
9	9.61186	9.96022	10.03978	10.38814	9.65164	10.34836	51
10	9.61214	9.96017	10.03983	10.38786	9.65197	10.34803	50
11	9.61242	9.96011	10.03989	10.38758	9.65231	10.34769	49
12	9.61270	9.96005	10.03995	10.38730	9.65265	10.34735	48
13	9.61298	9.96000	10.04000	10.38702	9.65299	10.34701	47
14	9.61326	9.95994	10.04006	10.38674	9.65333	10.34667	46
15	9.61354	9.95988	10.04012	10.38646	9.65366	10.34634	45
16	9.61382	9.95982	10.04018	10.38618	9.65400	10.34600	44
17	9.61411	9.95977	10.04023	10.38589	9.65434	10.34566	43
18	9.61438	9.95971	10.04029	10.38562	9.65467	10.34533	42
19	9.61466	9.95965	10.04035	10.38534	9.65501	10.34499	41
20	9.61494	9.95960	10.04040	10.38506	9.65535	10.34465	40
21	9.61522	9.95954	10.04046	10.38478	9.65568	10.34432	39
22	9.61550	9.95948	10.04052	10.38450	9.65602	10.34398	38
23	9.61578	9.95942	10.04058	10.38422	9.65636	10.34364	37
24	9.61606	9.95937	10.04063	10.38394	9.65669	10.34331	36
25	9.61634	9.95931	10.04069	10.38366	9.65703	10.34297	35
26	9.61662	9.95925	10.04075	10.38338	9.65736	10.34264	34
27	9.61689	9.95920	10.04080	10.38311	9.65770	10.34230	33
28	9.61717	9.95914	10.04086	10.38283	9.65803	10.34197	32
29	9.61745	9.95908	10.04092	10.38255	9.65837	10.34163	31
30	9.61773	9.95902	10.04098	10.38227	9.65870	10.34130	30
31	9.61800	9.95897	10.04103	10.38200	9.65904	10.34096	29
32	9.61828	9.95891	10.04109	10.38172	9.65937	10.34063	28
33	9.61856	9.95885	10.04115	10.38144	9.65971	10.34029	27
34	9.61883	9.95879	10.04121	10.38117	9.66004	10.33996	26
35	9.61911	9.95873	10.04127	10.38089	9.66038	10.33962	25
36	9.61939	9.95868	10.04132	10.38061	9.66071	10.33929	24
37	9.61966	9.95862	10.04138	10.38034	9.66104	10.33896	23
38	9.61994	9.95856	10.04144	10.38006	9.66138	10.33862	22
39	9.62021	9.95850	10.04150	10.37979	9.66171	10.33829	21
40	9.62049	9.95844	10.04156	10.37951	9.66204	10.33796	20
41	9.62076	9.95839	10.04161	10.37924	9.66238	10.33762	19
42	9.62104	9.95833	10.04167	10.37896	9.66271	10.33729	18
43	9.62131	9.95827	10.04173	10.37869	9.66304	10.33696	17
44	9.62159	9.95821	10.04179	10.37841	9.66337	10.33663	16
45	9.62186	9.95815	10.04185	10.37814	9.66371	10.33629	15
46	9.62214	9.95810	10.04190	10.37786	9.66404	10.33596	14
47	9.62241	9.95804	10.04196	10.37759	9.66437	10.33563	13
48	9.62268	9.95798	10.04202	10.37732	9.66470	10.33530	12
49	9.62296	9.95792	10.04208	10.37704	9.66503	10.33497	11
50	9.62323	9.95786	10.04214	10.37677	9.66537	10.33463	10
51	9.62350	9.95780	10.04220	10.37650	9.66570	10.33430	9
52	9.62377	9.95775	10.04225	10.37623	9.66603	10.33397	8
53	9.62405	9.95769	10.04231	10.37595	9.66636	10.33364	7
54	9.62432	9.95763	10.04237	10.37568	9.66669	10.33331	6
55	9.62459	9.95757	10.04243	10.37541	9.66702	10.33298	5
56	9.62486	9.95751	10.04249	10.37514	9.66735	10.33265	4
57	9.62513	9.95745	10.04255	10.37487	9.66768	10.33232	3
58	9.62541	9.95739	10.04261	10.37459	9.66801	10.33199	2
59	9.62568	9.95733	10.04267	10.37432	9.66834	10.33166	1
60	9.62595	9.95728	10.04272	10.37405	9.66867	10.33133	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

25°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.62595	9.95728	10.04272	10.37405	9.66867	10.33133	60
1	9.62622	9.95722	10.04278	10.37378	9.66900	10.33100	59
2	9.62649	9.95716	10.04284	10.37351	9.66933	10.33067	58
3	9.62676	9.95710	10.04290	10.37324	9.66966	10.33034	57
4	9.62703	9.95704	10.04296	10.37297	9.66999	10.33001	56
5	9.62730	9.95698	10.04302	10.37270	9.67032	10.32968	55
6	9.62757	9.95692	10.04308	10.37243	9.67065	10.32935	54
7	9.62784	9.95686	10.04314	10.37216	9.67098	10.32902	53
8	9.62811	9.95680	10.04320	10.37189	9.67131	10.32869	52
9	9.62838	9.95674	10.04326	10.37162	9.67163	10.32837	51
10	9.62865	9.95668	10.04332	10.37135	9.67196	10.32804	50
11	9.62892	9.95663	10.04337	10.37108	9.67229	10.32771	49
12	9.62918	9.95657	10.04343	10.37082	9.67262	10.32738	48
13	9.62945	9.95651	10.04349	10.37055	9.67295	10.32705	47
14	9.62972	9.95645	10.04355	10.37028	9.67327	10.32673	46
15	9.62999	9.95639	10.04361	10.37001	9.67360	10.32640	45
16	9.63026	9.95633	10.04367	10.36974	9.67393	10.32607	44
17	9.63052	9.95627	10.04373	10.36948	9.67426	10.32574	43
18	9.63079	9.95621	10.04379	10.36921	9.67458	10.32542	42
19	9.63106	9.95615	10.04385	10.36894	9.67491	10.32509	41
20	9.63133	9.95609	10.04391	10.36867	9.67524	10.32476	40
21	9.63159	9.95603	10.04397	10.36841	9.67556	10.32444	39
22	9.63186	9.95597	10.04403	10.36814	9.67589	10.32411	38
23	9.63213	9.95591	10.04409	10.36787	9.67622	10.32378	37
24	9.63239	9.95585	10.04415	10.36761	9.67654	10.32346	36
25	9.63266	9.95579	10.04421	10.36734	9.67687	10.32313	35
26	9.63292	9.95573	10.04427	10.36708	9.67719	10.32281	34
27	9.63319	9.95567	10.04433	10.36681	9.67752	10.32248	33
28	9.63345	9.95561	10.04439	10.36655	9.67785	10.32215	32
29	9.63372	9.95555	10.04445	10.36628	9.67817	10.32183	31
30	9.63398	9.95549	10.04451	10.36602	9.67850	10.32150	30
31	9.63425	9.95543	10.04457	10.36575	9.67882	10.32118	29
32	9.63451	9.95537	10.04463	10.36549	9.67915	10.32085	28
33	9.63478	9.95531	10.04469	10.36522	9.67947	10.32053	27
34	9.63504	9.95525	10.04475	10.36496	9.67980	10.32020	26
35	9.63531	9.95519	10.04481	10.36469	9.68012	10.31988	25
36	9.63557	9.95513	10.04487	10.36443	9.68044	10.31956	24
37	9.63583	9.95507	10.04493	10.36417	9.68077	10.31923	23
38	9.63610	9.95500	10.04500	10.36390	9.68109	10.31891	22
39	9.63636	9.95494	10.04506	10.36364	9.68142	10.31858	21
40	9.63662	9.95488	10.04512	10.36338	9.68174	10.31826	20
41	9.63689	9.95482	10.04518	10.36311	9.68206	10.31794	19
42	9.63715	9.95476	10.04524	10.36285	9.68239	10.31761	18
43	9.63741	9.95470	10.04530	10.36259	9.68271	10.31729	17
44	9.63767	9.95464	10.04536	10.36233	9.68303	10.31697	16
45	9.63794	9.95458	10.04542	10.36206	9.68336	10.31664	15
46	9.63820	9.95452	10.04548	10.36180	9.68368	10.31632	14
47	9.63846	9.95446	10.04554	10.36154	9.68400	10.31600	13
48	9.63872	9.95440	10.04560	10.36128	9.68432	10.31568	12
49	9.63898	9.95434	10.04566	10.36102	9.68465	10.31535	11
50	9.63924	9.95427	10.04573	10.36076	9.68497	10.31503	10
51	9.63950	9.95421	10.04579	10.36050	9.68529	10.31471	9
52	9.63976	9.95415	10.04585	10.36024	9.68561	10.31439	8
53	9.64002	9.95409	10.04591	10.35998	9.68593	10.31407	7
54	9.64028	9.95403	10.04597	10.35972	9.68626	10.31374	6
55	9.64054	9.95397	10.04603	10.35946	9.68658	10.31342	5
56	9.64080	9.95391	10.04609	10.35920	9.68690	10.31310	4
57	9.64106	9.95384	10.04616	10.35894	9.68722	10.31278	3
58	9.64132	9.95378	10.04622	10.35868	9.68754	10.31246	2
59	9.64158	9.95372	10.04628	10.35842	9.68786	10.31214	1
60	9.64184	9.95366	10.04634	10.35816	9.68818	10.31182	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

64°

26°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.64184	9.95366	10.04634	10.35816	9.68818	10.31182	60
1	9.64210	9.95360	10.04640	10.35790	9.68850	10.31150	59
2	9.64236	9.95354	10.04646	10.35764	9.68882	10.31118	58
3	9.64262	9.95348	10.04652	10.35738	9.68914	10.31086	57
4	9.64288	9.95341	10.04659	10.35712	9.68946	10.31054	56
5	9.64313	9.95335	10.04665	10.35687	9.68978	10.31022	55
6	9.64339	9.95329	10.04671	10.35661	9.69010	10.30990	54
7	9.64365	9.95323	10.04677	10.35635	9.69042	10.30958	53
8	9.64391	9.95317	10.04683	10.35609	9.69074	10.30926	52
9	9.64417	9.95310	10.04690	10.35583	9.69106	10.30894	51
10	9.64442	9.95304	10.04696	10.35558	9.69138	10.30862	50
11	9.64468	9.95298	10.04702	10.35532	9.69170	10.30830	49
12	9.64494	9.95292	10.04708	10.35506	9.69202	10.30798	48
13	9.64519	9.95286	10.04714	10.35481	9.69234	10.30766	47
14	9.64545	9.95279	10.04721	10.35455	9.69266	10.30734	46
15	9.64571	9.95273	10.04727	10.35429	9.69298	10.30702	45
16	9.64596	9.95267	10.04733	10.35404	9.69329	10.30671	44
17	9.64622	9.95261	10.04739	10.35378	9.69361	10.30639	43
18	9.64647	9.95254	10.04746	10.35353	9.69393	10.30607	42
19	9.64673	9.95248	10.04752	10.35327	9.69425	10.30575	41
20	9.64698	9.95242	10.04758	10.35302	9.69457	10.30543	40
21	9.64724	9.95236	10.04764	10.35276	9.69488	10.30512	39
22	9.64749	9.95229	10.04771	10.35251	9.69520	10.30480	38
23	9.64775	9.95223	10.04777	10.35225	9.69552	10.30448	37
24	9.64800	9.95217	10.04783	10.35200	9.69584	10.30416	36
25	9.64826	9.95211	10.04789	10.35174	9.69615	10.30385	35
26	9.64851	9.95204	10.04796	10.35149	9.69647	10.30353	34
27	9.64877	9.95198	10.04802	10.35123	9.69679	10.30321	33
28	9.64902	9.95192	10.04808	10.35098	9.69710	10.30290	32
29	9.64927	9.95185	10.04815	10.35073	9.69742	10.30258	31
30	9.64953	9.95179	10.04821	10.35047	9.69774	10.30226	30
31	9.64978	9.95173	10.04827	10.35022	9.69805	10.30195	29
32	9.65003	9.95167	10.04833	10.34997	9.69837	10.30163	28
33	9.65029	9.95160	10.04840	10.34971	9.69868	10.30132	27
34	9.65054	9.95154	10.04846	10.34946	9.69900	10.30100	26
35	9.65079	9.95148	10.04852	10.34921	9.69932	10.30068	25
36	9.65104	9.95141	10.04859	10.34896	9.69963	10.30037	24
37	9.65130	9.95135	10.04865	10.34870	9.69995	10.30005	23
38	9.65155	9.95129	10.04871	10.34845	9.70026	10.29974	22
39	9.65180	9.95122	10.04878	10.34820	9.70058	10.29942	21
40	9.65205	9.95116	10.04884	10.34795	9.70089	10.29911	20
41	9.65230	9.95110	10.04890	10.34770	9.70121	10.29879	19
42	9.65255	9.95103	10.04897	10.34745	9.70152	10.29848	18
43	9.65281	9.95097	10.04903	10.34719	9.70184	10.29816	17
44	9.65306	9.95090	10.04910	10.34694	9.70215	10.29785	16
45	9.65331	9.95084	10.04916	10.34669	9.70247	10.29753	15
46	9.65356	9.95078	10.04922	10.34644	9.70278	10.29722	14
47	9.65381	9.95071	10.04929	10.34619	9.70309	10.29691	13
48	9.65406	9.95065	10.04935	10.34594	9.70341	10.29659	12
49	9.65431	9.95059	10.04941	10.34569	9.70372	10.29628	11
50	9.65456	9.95052	10.04948	10.34544	9.70404	10.29596	10
51	9.65481	9.95046	10.04954	10.34519	9.70435	10.29565	9
52	9.65506	9.95039	10.04961	10.34494	9.70466	10.29534	8
53	9.65531	9.95033	10.04967	10.34469	9.70498	10.29502	7
54	9.65556	9.95027	10.04973	10.34444	9.70529	10.29471	6
55	9.65580	9.95020	10.04980	10.34420	9.70560	10.29440	5
56	9.65605	9.95014	10.04986	10.34395	9.70592	10.29408	4
57	9.65630	9.95007	10.04993	10.34370	9.70623	10.29377	3
58	9.65655	9.95001	10.04999	10.34345	9.70654	10.29346	2
59	9.65680	9.94995	10.05005	10.34320	9.70685	10.29315	1
60	9.65705	9.94988	10.05012	10.34295	9.70717	10.29283	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

27°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.65705	9.94988	10.05012	10.34295	9.70717	10.29283	60
1	9.65729	9.94982	10.05018	10.34271	9.70748	10.29252	59
2	9.65754	9.94975	10.05025	10.34246	9.70779	10.29221	58
3	9.65779	9.94969	10.05031	10.34221	9.70810	10.29190	57
4	9.65804	9.94962	10.05038	10.34196	9.70841	10.29159	56
5	9.65828	9.94956	10.05044	10.34172	9.70873	10.29127	55
6	9.65853	9.94949	10.05051	10.34147	9.70904	10.29096	54
7	9.65878	9.94943	10.05057	10.34122	9.70935	10.29065	53
8	9.65902	9.94936	10.05064	10.34098	9.70966	10.29034	52
9	9.65927	9.94930	10.05070	10.34073	9.70997	10.29003	51
10	9.65952	9.94923	10.05077	10.34048	9.71028	10.28972	50
11	9.65976	9.94917	10.05083	10.34024	9.71059	10.28941	49
12	9.66001	9.94911	10.05089	10.33999	9.71090	10.28910	48
13	9.66025	9.94904	10.05096	10.33975	9.71121	10.28879	47
14	9.66050	9.94898	10.05102	10.33950	9.71153	10.28847	46
15	9.66075	9.94891	10.05109	10.33925	9.71184	10.28816	45
16	9.66099	9.94885	10.05115	10.33901	9.71215	10.28785	44
17	9.66124	9.94878	10.05122	10.33876	9.71246	10.28754	43
18	9.66148	9.94871	10.05129	10.33852	9.71277	10.28723	42
19	9.66173	9.94865	10.05135	10.33827	9.71308	10.28692	41
20	9.66197	9.94858	10.05142	10.33803	9.71339	10.28661	40
21	9.66221	9.94852	10.05148	10.33779	9.71370	10.28630	39
22	9.66246	9.94845	10.05155	10.33754	9.71401	10.28599	38
23	9.66270	9.94839	10.05161	10.33730	9.71431	10.28569	37
24	9.66295	9.94832	10.05168	10.33705	9.71462	10.28538	36
25	9.66319	9.94826	10.05174	10.33681	9.71493	10.28507	35
26	9.66343	9.94819	10.05181	10.33657	9.71524	10.28476	34
27	9.66368	9.94813	10.05187	10.33632	9.71555	10.28445	33
28	9.66392	9.94806	10.05194	10.33608	9.71586	10.28414	32
29	9.66416	9.94799	10.05201	10.33584	9.71617	10.28383	31
30	9.66441	9.94793	10.05207	10.33559	9.71648	10.28352	30
31	9.66465	9.94786	10.05214	10.33535	9.71679	10.28321	29
32	9.66489	9.94780	10.05220	10.33511	9.71709	10.28291	28
33	9.66513	9.94773	10.05227	10.33487	9.71740	10.28260	27
34	9.66537	9.94767	10.05233	10.33463	9.71771	10.28229	26
35	9.66562	9.94760	10.05240	10.33438	9.71802	10.28198	25
36	9.66586	9.94753	10.05247	10.33414	9.71833	10.28167	24
37	9.66610	9.94747	10.05253	10.33390	9.71863	10.28137	23
38	9.66634	9.94740	10.05260	10.33366	9.71894	10.28106	22
39	9.66658	9.94734	10.05266	10.33342	9.71925	10.28075	21
40	9.66682	9.94727	10.05273	10.33318	9.71955	10.28045	20
41	9.66706	9.94720	10.05280	10.33294	9.71986	10.28014	19
42	9.66731	9.94714	10.05286	10.33269	9.72017	10.27983	18
43	9.66755	9.94707	10.05293	10.33245	9.72048	10.27952	17
44	9.66779	9.94700	10.05300	10.33221	9.72078	10.27922	16
45	9.66803	9.94694	10.05306	10.33197	9.72109	10.27891	15
46	9.66827	9.94687	10.05313	10.33173	9.72140	10.27860	14
47	9.66851	9.94680	10.05320	10.33149	9.72170	10.27830	13
48	9.66875	9.94674	10.05326	10.33125	9.72201	10.27799	12
49	9.66899	9.94667	10.05333	10.33101	9.72231	10.27769	11
50	9.66922	9.94660	10.05340	10.33078	9.72262	10.27738	10
51	9.66946	9.94654	10.05346	10.33054	9.72293	10.27707	9
52	9.66970	9.94647	10.05353	10.33030	9.72323	10.27677	8
53	9.66994	9.94640	10.05360	10.33006	9.72354	10.27646	7
54	9.67018	9.94634	10.05366	10.32982	9.72384	10.27616	6
55	9.67042	9.94627	10.05373	10.32958	9.72415	10.27585	5
56	9.67066	9.94620	10.05380	10.32934	9.72445	10.27555	4
57	9.67090	9.94614	10.05386	10.32910	9.72476	10.27524	3
58	9.67113	9.94607	10.05393	10.32887	9.72506	10.27494	2
59	9.67137	9.94600	10.05400	10.32863	9.72537	10.27463	1
60	9.67161	9.94593	10.05407	10.32839	9.72567	10.27433	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

28°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.67161	9.94593	10.05407	10.32839	9.72567	10.27433	60
1	9.67185	9.94587	10.05413	10.32815	9.72598	10.27402	59
2	9.67208	9.94580	10.05420	10.32792	9.72628	10.27372	58
3	9.67232	9.94573	10.05427	10.32768	9.72659	10.27341	57
4	9.67256	9.94567	10.05433	10.32744	9.72689	10.27311	56
5	9.67280	9.94560	10.05440	10.32720	9.72720	10.27280	55
6	9.67303	9.94553	10.05447	10.32697	9.72750	10.27250	54
7	9.67327	9.94546	10.05454	10.32673	9.72780	10.27220	53
8	9.67350	9.94540	10.05460	10.32650	9.72811	10.27189	52
9	9.67374	9.94533	10.05467	10.32626	9.72841	10.27159	51
10	9.67398	9.94526	10.05474	10.32602	9.72872	10.27128	50
11	9.67421	9.94519	10.05481	10.32579	9.72902	10.27098	49
12	9.67445	9.94513	10.05487	10.32555	9.72932	10.27068	48
13	9.67468	9.94506	10.05494	10.32532	9.72963	10.27037	47
14	9.67492	9.94499	10.05501	10.32508	9.72993	10.27007	46
15	9.67515	9.94492	10.05508	10.32485	9.73023	10.26977	45
16	9.67539	9.94485	10.05515	10.32461	9.73054	10.26946	44
17	9.67562	9.94479	10.05521	10.32438	9.73084	10.26916	43
18	9.67586	9.94472	10.05528	10.32414	9.73114	10.26886	42
19	9.67609	9.94465	10.05535	10.32391	9.73144	10.26856	41
20	9.67633	9.94458	10.05542	10.32367	9.73175	10.26825	40
21	9.67656	9.94451	10.05549	10.32344	9.73205	10.26795	39
22	9.67680	9.94445	10.05555	10.32320	9.73235	10.26765	38
23	9.67703	9.94438	10.05562	10.32297	9.73265	10.26735	37
24	9.67726	9.94431	10.05569	10.32274	9.73295	10.26705	36
25	9.67750	9.94424	10.05576	10.32250	9.73326	10.26674	35
26	9.67773	9.94417	10.05583	10.32227	9.73356	10.26644	34
27	9.67796	9.94410	10.05590	10.32204	9.73386	10.26614	33
28	9.67820	9.94404	10.05596	10.32180	9.73416	10.26584	32
29	9.67843	9.94397	10.05603	10.32157	9.73446	10.26554	31
30	9.67866	9.94390	10.05610	10.32134	9.73476	10.26524	30
31	9.67890	9.94383	10.05617	10.32110	9.73507	10.26493	29
32	9.67913	9.94376	10.05624	10.32087	9.73537	10.26463	28
33	9.67936	9.94369	10.05631	10.32064	9.73567	10.26433	27
34	9.67959	9.94362	10.05638	10.32041	9.73597	10.26403	26
35	9.67982	9.94355	10.05645	10.32018	9.73627	10.26373	25
36	9.68006	9.94349	10.05651	10.31994	9.73657	10.26343	24
37	9.68029	9.94342	10.05658	10.31971	9.73687	10.26313	23
38	9.68052	9.94335	10.05665	10.31948	9.73717	10.26283	22
39	9.68075	9.94328	10.05672	10.31925	9.73747	10.26253	21
40	9.68098	9.94321	10.05679	10.31902	9.73777	10.26223	20
41	9.68121	9.94314	10.05686	10.31879	9.73807	10.26193	19
42	9.68144	9.94307	10.05693	10.31856	9.73837	10.26163	18
43	9.68167	9.94300	10.05700	10.31833	9.73867	10.26133	17
44	9.68190	9.94293	10.05707	10.31810	9.73897	10 26103	16
45	9.68213	9.94286	10.05714	10.31787	9.73927	10.26073	15
46	9.68237	9.94279	10.05721	10.31763	9.73957	10.26043	14
47	9.68260	9.94273	10.05727	10.31740	9.73987	10.26013	13
48	9.68283	9.94266	10.05734	10.31717	9.74017	10.25983	12
49	9.68305	9.94259	10.05741	10.31695	9.74047	10.25953	11
50	9.68328	9.94252	10.05748	10.31672	9.74077	10.25923	10
51	9.68351	9.94245	10.05755	10.31649	9.74107	10.25893	9
52	9.68374	9.94238	10.05762	10.31626	9.74137	10.25863	8
53	9.68397	9.94231	10.05769	10.31603	9.74166	10.25834	7
54	9 68420	9.94224	10.05776	10.31580	9.74196	10.25804	6
55	9.68443	9.94217	10.05783	10.31557	9.74226	10.25774	5
56	9.68466	9.94210	10.05790	10.31534	9.74256	10.25744	4
57	9.68489	9.94203	10.05797	10.31511	9.74286	10.25714	3
58	9.68512	9.94196	10.05804	10.31488	9.74316	10.25684	2
59	9.68534	9.94189	10.05811	10.31466	9.74345	10.25655	1
60	9.68557	9.94182	10.05818	10.31443	9.74375	10.25625	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

61°

29°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.68557	9.94182	10.05818	10 31443	9.74375	10.25625	60
1	9.68580	9.94175	10.05825	10.31420	9.74405	10.25595	59
2	9.68603	9.94168	10.05832	10.31397	9.74435	10.25565	58
3	9.68625	9.94161	10.05839	10.31375	9.74465	10.25535	57
4	9.68648	9.94154	10.05846	10.31352	9.74494	10.25506	56
5	9.68671	9.94147	10 05853	10.31329	9.74524	10.25476	55
6	9.68694	9.94140	10.05860	10.31306	9.74554	10.25446	54
7	9.68716	9.94133	10.05867	10.31284	9.74583	10.25417	53
8	9.68739	9.94126	10.05874	10.31261	9.74613	10.25387	52
9	9.68762	9.94119	10.05881	10.31238	9.74643	10.25357	51
10	9.68784	9.94112	10.05888	10.31216	9.74673	10.25327	50
11	9.68807	9.94105	10.05895	10.31193	9.74702	10.25298	49
12	9.68829	9.94098	10.05902	10.31171	9.74732	10.25268	48
13	9.68852	9.94090	10.05910	10.31148	9.74762	10.25238	47
14	9.68875	9.94083	10.05917	10.31125	9.74791	10.25209	46
15	9.68897	9.94076	10.05924	10.31103	9.74821	10.25179	45
16	9.68920	9.94069	10.05931	10.31080	9.74851	10.25149	44
17	9.68942	9.94062	10.05938	10.31058	9.74880	10.25120	43
18	9.68965	9.94055	10.05945	10.31035	9.74910	10.25090	42
19	9.68987	9.94048	10.05952	10.31013	9.74939	10.25061	41
20	9.69010	9.94041	10.05959	10.30990	9.74969	10.25031	40
21	9.69032	9.94034	10.05966	10.30968	9.74998	10.25002	39
22	9.69055	9.94027	10.05973	10.30945	9.75028	10.24972	38
23	9.69077	9.94020	10.05980	10.30923	9.75058	10.24942	37
24	9.69100	9.94012	10.05988	10.30900	9.75087	10.24913	36
25	9.69122	9.94005	10.05995	10.30878	9.75117	10.24883	35
26	9.69144	9.93998	10.06002	10.30856	9.75146	10.24854	34
27	9.69167	9.93991	10.06009	10.30833	9.75176	10.24824	33
28	9.69189	9.93984	10.06016	10.30811	9.75205	10.24795	32
29	9.69212	9.93977	10.06023	10.30788	9.75235	10.24765	31
30	9.69234	9.93970	10.06030	10.30766	9.75264	10.24736	30
31	9.69256	9.93963	10.06037	10.30744	9.75294	10.24706	29
32	9.69279	9.93955	10.06045	10.30721	9.75323	10.24677	28
33	9.69301	9.93948	10.06052	10.30699	9.75353	10.24647	27
34	9.69323	9.93941	10.06059	10.30677	9.75382	10.24618	26
35	9.69345	9.93934	10.06066	10.30655	9.75411	10.24589	25
36	9.69368	9.93927	10.06073	10.30632	9.75441	10.24559	24
37	9.69390	9.93920	10.06080	10.30610	9.75470	10.24530	23
38	9.69412	9.93912	10.06088	10.30588	9.75500	10.24500	22
39	9.69434	9.93905	10.06095	10.30566	9.75529	10.24471	21
40	9.69456	9.93898	10.06102	10.30544	9.75558	10.24442	20
41	9.69479	9.93891	10.06109	10.30521	9.75588	10.24412	19
42	9.69501	9.93884	10.06116	10.30499	9.75617	10.24383	18
43	9.69523	9.93876	10.06124	10.30477	9.75647	10.24353	17
44	9.69545	9.93869	10.06131	10.30455	9.75676	10.24324	16
45	9.69567	9.93862	10.06138	10.30433	9 75705	10.24295	15
46	9.69589	9.93855	10.06145	10.30411	9.75735	10.24265	14
47	9.69611	9.93847	10.06153	10.30389	9.75764	10.24236	13
48	9.69633	9.93840	10.06160	10.30367	9.75793	10.24207	12
49	9.69655	9.93833	10.06167	10.30345	9.75822	10.24178	11
50	9.69677	9.93826	10.06174	10.30323	9.75852	10 24148	10
51	9.69699	9.93819	10.06181	10.30301	9.75881	10.24119	9
52	9.69721	9.93811	10.06189	10.30279	9.75910	10.24090	8
53	9.69743	9.93804	10.06196	10.30257	9.75939	10.24061	7
54	9.69765	9.93797	10.06203	10.30235	9.75969	10.24031	6
55	9.69787	9.93789	10.06211	10.30213	9.75998	10.24002	5
56	9.69809	9.93782	10.06218	10.30191	9.76027	10.23973	4
57	9.69831	9.93775	10.06225	10.30169	9.76056	10.23944	3
58	9.69853	9.93768	10 06232	10.30147	9.76086	10.23914	2
59	9.69875	9.93760	10 06240	10.30125	9.76115	10.23885	1
60	9.69897	9.93753	10.06247	10.30103	9.76144	10.23856	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang	Tangent.	′

60°

30°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.69897	9.93753	10.06247	10.30103	9.76144	10.23856	60
1	9.69919	9.93746	10.06254	10.30081	9.76173	10.23827	59
2	9.69941	9.93738	10.06262	10.30059	9.76202	10.23798	58
3	9.69963	9.93731.	10.06269	10.30037	9.76231	10.23769	57
4	9.69984	9.93724	10.06276	10.30016	9.76261	10.23739	56
5	9.70006	9.93717	10.06283	10.29994	9.76290	10.23710	55
6	9.70028	9.93709	10.06291	10.29972	9.76319	10.23681	54
7	9.70050	9.93702	10.06298	10.29950	9.76348	10.23652	53
8	9.70072	9.93695	10.06305	10.29928	9.76377	10.23623	52
9	9.70093	9.93687	10.06313	10.29907	9.76406	10.23594	51
10	9.70115	9.93680	10.06320	10.29885	9.76435	10.23565	50
11	9.70137	9.93673	10.06327	10.29863	9.76464	10.23536	49
12	9.70159	9.93665	10.06335	10.29841	9.76493	10.23507	48
13	9.70180	9.93658	10.06342	10.29820	9.76522	10.23478	47
14	9.70202	9.93650	10.06350	10.29798	9.76551	10.23449	46
15	9.70224	9.93643	10.06357	10.29776	9.76580	10.23420	45
16	9.70245	9.93636	10.06364	10.29755	9.76609	10.23391	44
17	9.70267	9.93628	10.06372	10.29733	9.76639	10.23361	43
18	9.70288	9.93621	10.06379	10.29712	9.76668	10.23332	42
19	9.70310	9.93614	10.06386	10.29690	9.76697	10.23303	41
20	9.70332	9.93606	10.06394	10.29668	9.76725	10.23275	40
21	9.70353	9.93599	10.06401	10.29647	9.76754	10.23246	39
22	9.70375	9.93591	10.06409	10.29625	9.76783	10.23217	38
23	9.70396	9.93584	10.06416	10.29604	9.76812	10.23188	37
24	9.70418	9.93577	10.06423	10.29582	9.76841	10.23159	36
25	9.70439	9.93569	10.06431	10.29561	9.76870	10.23130	35
26	9.70461	9.93562	10.06438	10.29539	9.76899	10.23101	34
27	9.70482	9.93554	10.06446	10.29518	9.76928	10.23072	33
28	9.70504	9.93547	10.06453	10.29496	9.76957	10.23043	32
29	9.70525	9.93539	10.06461	10.29475	9.76986	10.23014	31
30	9.70547	9.93532	10.06468	10.29453	9.77015	10.22985	30
31	9.70568	9.93525	10.06475	10.29432	9.77044	10.22956	29
32	9.70590	9.93517	10.06483	10.29410	9.77073	10.22927	28
33	9.70611	9.93510	10.06490	10.29389	9.77101	10.22899	27
34	9.70633	9.93502	10.06498	10.29367	9.77130	10.22870	26
35	9.70654	9.93495	10.06505	10.29346	9.77159	10.22841	25
36	9.70675	9.93487	10.06513	10.29325	9.77188	10.22812	24
37	9.70697	9.93480	10.06520	10.29303	9.77217	10.22783	23
38	9.70718	9.93472	10.06528	10.29282	9.77246	10.22754	22
39	9.70739	9.93465	10.06535	10.29261	9.77274	10.22726	21
40	9.70761	9.93457	10.06543	10.29239	9.77303	10.22697	20
41	9.70782	9.93450	10.06550	10.29218	9.77332	10.22668	19
42	9.70803	9.93442	10.06558	10.29197	9.77361	10.22639	18
43	9.70824	9.93435	10.06565	10.29176	9.77390	10.22610	17
44	9.70846	9.93427	10.06573	10.29154	9.77418	10.22582	16
45	9.70867	9.93420	10.06580	10.29133	9.77447	10.22553	15
46	9.70888	9.93412	10.06588	10.29112	9.77476	10.22524	14
47	9.70909	9.93405	10.06595	10.29091	9.77505	10.22495	13
48	9.70931	9.93397	10.06603	10.29069	9.77533	10.22467	12
49	9.70952	9.93390	10.06610	10.29048	9.77562	10.22438	11
50	9.70973	9.93382	10.06618	10.29027	9.77591	10.22409	10
51	9.70994	9.93375	10.06625	10.29006	9.77619	10.22381	9
52	9.71015	9.93367	10.06633	10.28985	9.77648	10.22352	8
53	9.71036	9.93360	10.06640	10.28964	9.77677	10.22323	7
54	9.71058	9.93352	10.06648	10.28942	9.77706	10.22294	6
55	9.71079	9.93344	10.06656	10.28921	9.77734	10.22266	5
56	9.71100	9.93337	10.06663	10.28900	9.77763	10.22237	4
57	9.71121	9.93329	10.06671	10.28879	9.77791	10.22209	3
58	9.71142	9.93322	10.06678	10.28858	9.77820	10.22180	2
59	9.71163	9.93314	10.06686	10.28837	9.77849	10.22151	1
60	9.71184	9.93307	10.06693	10.28816	9.77877	10.22123	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

31°

′	Sine.	Cosine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.71184	9.93307	10.06693	10.28816	9.77877	10.22123	60
1	9.71205	9.93299	10.06701	10.28795	9.77906	10.22094	59
2	9.71226	9.93291	10.06709	10.28774	9.77935	10.22065	58
3	9.71247	9.93284	10.06716	10.28753	9.77963	10.22037	57
4	9.71268	9.93276	10.06724	10.28732	9.77992	10.22008	56
5	9.71289	9.93269	10.06731	10.28711	9.78020	10.21980	55
6	9.71310	9.93261	10.06739	10.28690	9.78049	10.21951	54
7	9.71331	9.93253	10.06747	10.28669	9.78077	10.21923	53
8	9.71352	9.93246	10.06754	10.28648	9.78106	10.21894	52
9	9.71373	9.93238	10.06762	10.28627	9.78135	10.21865	51
10	9.71393	9.93230	10.06770	10.28607	9.78163	10.21837	50
11	9.71414	9.93223	10.06777	10.28586	9.78192	10.21808	49
12	9.71435	9.93215	10.06785	10.28565	9.78220	10.21780	48
13	9.71456	9.93207	10.06793	10.28544	9.78249	10.21751	47
14	9.71477	9.93200	10.06800	10.28523	9.78277	10.21723	46
15	9.71498	9.93192	10.06808	10.28502	9.78306	10.21694	45
16	9.71519	9.93184	10.06816	10.28481	9.78334	10.21666	44
17	9.71539	9.93177	10.06823	10.28461	9.78363	10.21637	43
18	9.71560	9.93169	10.06831	10.28440	9.78391	10.21609	42
19	9.71581	9.93161	10.06839	10.28419	9.78419	10.21581	41
20	9.71602	9.93154	10.06846	10.28398	9.78448	10.21552	40
21	9.71622	9.93146	10.06854	10.28378	9.78476	10.21524	39
22	9.71643	9.93138	10.06862	10.28357	9.78505	10.21495	38
23	9.71664	9.93131	10.06869	10.28336	9.78533	10.21467	37
24	9.71685	9.93123	10.06877	10.28315	9.78562	10.21438	36
25	9.71705	9.93115	10.06885	10.28295	9.78590	10.21410	35
26	9.71726	9.93108	10.06892	10.28274	9.78618	10.21382	34
27	9.71747	9.93100	10.06900	10.28253	9.78647	10.21353	33
28	9.71767	9.93092	10.06908	10.28233	9.78675	10.21325	32
29	9.71788	9.93084	10.06916	10.28212	9.78704	10.21296	31
30	9.71809	9.93077	10.06923	10.28191	9.78732	10.21268	30
31	9.71829	9.93069	10.06931	10.28171	9.78760	10.21240	29
32	9.71850	9.93061	10.06939	10.28150	9.78789	10.21211	28
33	9.71870	9.93053	10.06947	10.28130	9.78817	10.21183	27
34	9.71891	9.93046	10.06954	10.28109	9.78845	10.21155	26
35	9.71911	9.93038	10.06962	10.28089	9.78874	10.21126	25
36	9.71932	9.93030	10.06970	10.28068	9.78902	10.21098	24
37	9.71952	9.93022	10.06978	10.28048	9.78930	10.21070	23
38	9.71973	9.93014	10.06986	10.28027	9.78959	10.21041	22
39	9.71994	9.93007	10.06993	10.28006	9.78987	10.21013	21
40	9.72014	9.92999	10.07001	10.27986	9.79015	10.20985	20
41	9.72034	9.92991	10.07009	10.27966	9.79043	10.20957	19
42	9.72055	9.92983	10.07017	10.27945	9.79072	10.20928	18
43	9.72075	9.92976	10.07024	10.27925	9.79100	10.20900	17
44	9.72096	9.92968	10.07032	10.27904	9.79128	10.20872	16
45	9.72116	9.92960	10.07040	10.27884	9.79156	10.20844	15
46	9.72137	9.92952	10.07048	10.27863	9.79185	10.20815	14
47	9.72157	9.92944	10.07056	10.27843	9.79213	10.20787	13
48	9.72177	9.92936	10.07064	10.27823	9.79241	10.20759	12
49	9.72198	9.92929	10.07071	10.27802	9.79269	10.20731	11
50	9.72218	9.92921	10.07079	10.27782	9.79297	10.20703	10
51	9.72238	9.92913	10.07087	10.27762	9.79326	10.20674	9
52	9.72259	9.92905	10.07095	10.27741	9.79354	10.20646	8
53	9.72279	9.92897	10.07103	10.27721	9.79382	10.20618	7
54	9.72299	9.92889	10.07111	10.27701	9.79410	10.20590	6
55	9.72320	9.92881	10.07119	10.27680	9.79438	10.20562	5
56	9.72340	9.92874	10.07126	10.27660	9.79466	10.20534	4
57	9.72360	9.92866	10.07134	10.27640	9.79495	10.20505	3
58	9.72381	9.92858	10.07142	10.27619	9.79523	10.20477	2
59	9.72401	9.92850	10.07150	10.27599	9.79551	10.20449	1
60	9.72421	9.92842	10.07158	10.27579	9.79579	10.20421	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

32°

′	Sine.	Co-sine.	Secant.	Co-secant	Tangent.	Co-tang.	′
0	9.72421	9.92842	10.07158	10.27579	9.79579	10.20421	60
1	9.72441	9.92834	10.07166	10.27559	9.79607	10.20393	59
2	9.72461	9.92826	10.07174	10.27539	9.79635	10.20365	58
3	9.72482	9.92818	10.07182	10.27518	9.79663	10.20337	57
4	9.72502	9.92810	10.07190	10.27498	9.79691	10.20309	56
5	9.72522	9.92803	10.07197	10.27478	9.79719	10.20281	55
6	9.72542	9.92795	10.07205	10.27458	9.79747	10.20253	54
7	9.72562	9.92787	10.07213	10.27438	9.79776	10.20224	53
8	9.72582	9.92779	10.07221	10.27418	9.79804	10.20196	52
9	9.72602	9.92771	10.07229	10.27398	9.79832	10.20168	51
10	9.72622	9.92763	10.07237	10.27378	9.79860	10.20140	50
11	9.72643	9 92755	10.07245	10.27357	9.79888	10.20112	49
12	9.72663	9.92747	10.07253	10.27337	9.79916	10.20084	48
13	9.72683	9.92739	10.07261	10.27317	9.79944	10.20056	47
14	9.72703	9.92731	10.07269	10.27297	9.79972	10.20028	46
15	9.72723	9.92723	10.07277	10.27277	9.80000	10.20000	45
16	9.72743	9.92715	10.07285	10.27257	9.80028	10.19972	44
17	9.72763	9.92707	10.07293	10.27237	9.80056	10.19944	43
18	9.72783	9.92699	10.07301	10.27217	9.80084	10.19916	42
19	9.72803	9.92691	10.07309	10.27197	9.80112	10.19888	41
20	9.72823	9.92683	10.07317	10.27177	9.80140	10.19860	40
21	9.72843	9.92675	10.07325	10.27157	9.80168	10.19832	39
22	9.72863	9.92667	10.07333	10.27137	9.80195	10.19805	38
23	9.72883	9.92659	10.07341	10.27117	9.80223	10.19777	37
24	9.72902	9.92651	10.07349	10.27098	9.80251	10.19749	36
25	9.72922	9.92643	10.07357	10.27078	9.80279	10.19721	35
26	9.72942	9.92635	10.07365	10.27058	9.80307	10.19693	34
27	9.72962	9.92627	10.07373	10.27038	9.80335	10.19665	33
28	9.72982	9.92619	10.07381	10.27018	9.80363	10.19637	32
29	9.73002	9.92611	10.07389	10.26998	9.80391	10.19609	31
30	9.73022	9.92603	10.07397	10.26978	9.80419	10.19581	30
31	9.73041	9.92595	10.07405	10.26959	9.80447	10.19553	29
32	9.73061	9.92587	10.07413	10.26939	9.80474	10.19526	28
33	9.73081	9.92579	10.07421	10.26919	9.80502	10.19498	27
34	9.73101	9.92571	10.07429	10.26899	9.80530	10.19470	26
35	9.73121	9.92563	10.07437	10.26879	9.80558	10.19442	25
36	9.73140	9.92555	10.07445	10.26860	9.80586	10.19414	24
37	9.73160	9.92546	10.07454	10.26840	9.80614	10.19386	23
38	9.73180	9.92538	10.07462	10.26820	9.80642	10.19358	22
39	9.73200	9.92530	10.07470	10.26800	9.80669	10.19331	21
40	9.73219	9.92522	10.07478	10.26781	9.80697	10.19303	20
41	9.73239	9.92514	10.07486	10.26761	9.80725	10.19275	19
42	9.73259	9.92506	10.07494	10.26741	9.80753	10.19247	18
43	9.73278	9.92498	10.07502	10.26722	9.80781	10.19219	17
44	9.73298	9.92490	10.07510	10.26702	9.80808	10.19192	16
45	9.73318	9.92482	10.07518	10.26682	9.80836	10.19164	15
46	9.73337	9 92473	10.07527	10.26663	9.80864	10.19136	14
47	9.73357	9.92465	10.07535	10.26643	9.80892	10.19108	13
48	9.73377	9.92457	10.07543	10.26623	9.80919	10.19081	12
49	9.73396	9.92449	10.07551	10.26604	9.80947	10.19053	11
50	9.73416	9.92441	10.07559	10.26584	9.80975	10.19025	10
51	9.73435	9.92433	10.07567	10.26565	9.81003	10.18997	9
52	9.73455	9.92425	10.07575	10.26545	9.81030	10.18970	8
53	9.73474	9.92416	10.07584	10.26526	9.81058	10.18942	7
54	9.73494	9.92408	10.07592	10.26506	9.81086	10.18914	6
55	9.73513	9.92400	10.07600	10.26487	9.81113	10.18887	5
56	9.73533	9.92392	10.07608	10.26467	9.81141	10.18859	4
57	9.73552	9.92384	10.07616	10.26448	9.81169	10.18831	3
58	9.73572	9.92376	10.07624	10.26428	9.81196	10.18804	2
59	9.73591	9.92367	10.07633	10.26409	9.81224	10.18776	1
60	9.73611	9.92359	10.07641	10.26389	9.81252	10.18748	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

33°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.73611	9.92359	10.07641	10.26389	9.81252	10.18748	60
1	9.73630	9.92351	10.07649	10.26370	9.81279	10.18721	59
2	9.73650	9.92343	10.07657	10.26350	9.81307	10.18693	58
3	9.73669	9.92335	10.07665	10.26331	9.81335	10.18665	57
4	9.73689	9.92326	10.07674	10.26311	9.81362	10.18638	56
5	9.73708	9.92318	10.07682	10.26292	9.81390	10.18610	55
6	9.73727	9.92310	10.07690	10.26273	9.81418	10.18582	54
7	9.73747	9.92302	10.07698	10.26253	9.81445	10.18555	53
8	9.73766	9.92293	10.07707	10.26234	9.81473	10.18527	52
9	9.73785	9.92285	10.07715	10.26215	9.81500	10.18500	51
10	9.73805	9.92277	10.07723	10.26195	9.81528	10.18472	50
11	9.73824	9.92269	10.07731	10.26176	9.81556	10.18444	49
12	9.73843	9.92260	10.07740	10.26157	9.81583	10.18417	48
13	9.73863	9.92252	10.07748	10.26137	9.81611	10.18389	47
14	9.73882	9.92244	10.07756	10.26118	9.81638	10.18362	46
15	9.73901	9.92235	10.07765	10.26099	9.81666	10.18334	45
16	9.73921	9.92227	10.07773	10.26079	9.81693	10.18307	44
17	9.73940	9.92219	10.07781	10.26060	9.81721	10.18279	43
18	9.73959	9.92211	10.07789	10.26041	9.81748	10.18252	42
19	9.73978	9.92202	10.07798	10.26022	9.81776	10.18224	41
20	9.73997	9.92194	10.07806	10.26003	9.81803	10 18197	40
21	9.74017	9.92186	10.07814	10.25983	9.81831	10.18169	39
22	9.74036	9.92177	10.07823	10.25964	9.81858	10.18142	38
23	9.74055	9.92169	10.07831	10.25945	9.81886	10.18114	37
24	9.74074	9.92161	10.07839	10.25926	9.81913	10.18087	36
25	9.74093	9.92152	10.07848	10.25907	9.81941	10.18059	35
26	9.74113	9 92144	10.07856	10.25887	9.81968	10.18032	34
27	9.74132	9.92136	10.07864	10.25868	9.81996	10.18004	33
28	9.74151	9.92127	10.07873	10.25849	9.82023	10.17977	32
29	9.74170	9.92119	10.07881	10.25830	9.82051	10.17949	31
30	9.74189	9.92111	10.07889	10.25811	9.82078	10.17922	30
31	9.74208	9.92102	10.07898	10.25792	9.82106	10.17894	29
32	9.74227	9.92094	10.07906	10.25773	9.82133	10.17867	28
33	9.74246	9.92086	10.07914	10.25754	9.82161	10.17839	27
34	9.74265	9.92077	10.07923	10.25735	9.82188	10.17812	26
35	9.74284	9.92069	10.07931	10.25716	9.82215	10.17785	25
36	9.74303	9.92060	10.07940	10.25697	9.82243	10.17757	24
37	9.74322	9.92052	10.07948	10.25678	9.82270	10.17730	23
38	9.74341	9.92044	10.07956	10.25659	9.82298	10.17702	22
39	9.74360	9.92035	10.07965	10.25640	9.82325	10.17675	21
40	9.74379	9.92027	10.07973	10.25621	9.82352	10.17648	20
41	9.74398	9.92018	10 07982	10.25602	9.82380	10.17620	19
42	9.74417	9.92010	10.07990	10.25583	9.82407	10.17593	18
43	9.74436	9.92002	10.07998	10.25564	9.82435	10.17565	17
44	9.74455	9.91993	10.08007	10 25545	9.82462	10.17538	16
45	9.74474	9.91985	10.08115	10.25526	9.82489	10.17511	15
46	9.74493	9.91976	10.08024	10.25507	9.82517	10.17483	14
47	9.74512	9.91968	10.08032	10 25488	9.82544	10.17456	13
48	9.74531	9.91959	10.08041	10.25469	9.82571	10.17429	12
49	9.74549	9.91951	10.08049	10.25451	9.82599	10.17401	11
50	9.74568	9.91942	10.08058	10.25432	9.82626	10.17374	10
51	9.74587	9.91934	10.08066	10.25413	9.82653	10.17347	9
52	9.74606	9.91925	10.08075	10.25394	9.82681	10.17319	8
53	9.74625	9.91917	10.08083	10.25375	9.82708	10.17292	7
54	9.74644	9.91908	10.08092	10.25356	9.82735	10.17265	6
55	9.74662	9.91900	10.08100	10.25338	9.82762	10.17238	5
56	9.74681	9.91891	10.08109	10.25319	9.82790	10.17210	4
57	9.74700	9.91883	10.08117	10.25300	9.82817	10.17183	3
58	9.74719	9.91874	10.08126	10.25281	9.82844	10.17156	2
59	9.74737	9.91866	10.08134	10.25263	9.82871	10.17129	1
60	9.74756	9.91857	10.08143	10.25244	9.82899	10.17101	0
′	Co-sine	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

56°

34°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.74756	9.91857	10.08143	10.25244	9.82899	10.17101	60
1	9.74775	9.91849	10.08151	10.25225	9.82926	10.17074	59
2	9.74794	9.91840	10.08160	10.25206	9.82953	10.17047	58
3	9.74812	9.91832	10.08168	10.25188	9.82980	10.17020	57
4	9.74831	9.91823	10.08177	10.25169	9.83008	10.16992	56
5	9.74850	9.91815	10.08185	10.25150	9.83035	10.16965	55
6	9.74868	9.91806	10.08194	10.25132	9.83062	10.16938	54
7	9.74887	9.91798	10.08202	10.25113	9.83089	10.16911	53
8	9.74906	9.91789	10.08211	10.25094	9.83117	10.16883	52
9	9.74924	9.91781	10.08219	10.25076	9.83144	10.16856	51
10	9.74943	9.91772	10.08228	10.25057	9.83171	10.16829	50
11	9.74961	9.91763	10.08237	10.25039	9.83198	10.16802	49
12	9.74980	9.91755	10.08245	10.25020	9.83225	10.16775	48
13	9.74999	9.91746	10.08254	10.25001	9.83252	10.16748	47
14	9.75017	9.91738	10.08262	10.24983	9.83280	10.16720	46
15	9.75036	9.91729	10.08271	10.24964	9.83307	10.16693	45
16	9.75054	9.91720	10.08280	10.24946	9.83334	10.16666	44
17	9.75073	9.91712	10.08288	10.24927	9.83361	10.16639	43
18	9.75091	9.91703	10.08297	10.24909	9.83388	10.16612	42
19	9.75110	9.91695	10.08305	10.24890	9.83415	10.16585	41
20	9.75128	9.91686	10.08314	10.24872	9.83442	10.16558	40
21	9.75147	9.91677	10.08323	10.24853	9.83470	10.16530	39
22	9.75165	9.91669	10.08331	10.24835	9.83497	10.16503	38
23	9.75184	9.91660	10.08340	10.24816	9.83524	10.16476	37
24	9.75202	9.91651	10.08349	10.24798	9.83551	10.16449	36
25	9.75221	9.91643	10.08357	10.24779	9.83578	10.16422	35
26	9.75239	9.91634	10.08366	10.24761	9.83605	10.16395	34
27	9.75258	9.91625	10.08375	10.24742	9.83632	10.16368	33
28	9.75276	9.91617	10.08383	10.24724	9.83659	10.16341	32
29	9.75294	9.91608	10.08392	10.24706	9.83686	10.16314	31
30	9.75313	9.91599	10.08401	10.24687	9.83713	10.16287	30
31	9.75331	9.91591	10.08409	10.24669	9.83740	10.16260	29
32	9.75350	9.91582	10.08418	10.24650	9.83768	10.16232	28
33	9.75368	9.91573	10.08427	10.24632	9.83795	10.16205	27
34	9.75386	9.91565	10.08435	10.24614	9.83822	10.16178	26
35	9.75405	9.91556	10.08444	10.24595	9.83849	10.16151	25
36	9.75423	9.91547	10.08453	10.24577	9.83876	10.16124	24
37	9.75441	9.91538	10.08462	10.24559	9.83903	10.16097	23
38	9.75459	9.91530	10.08470	10.24541	9.83930	10.16070	22
39	9.75478	9.91521	10.08479	10.24522	9.83957	10.16043	21
40	9.75496	9.91512	10.08488	10.24504	9.83984	10.16016	20
41	9.75514	9.91504	10.08496	10.24486	9.84011	10.15989	19
42	9.75533	9.91495	10.08505	10.24467	9.84038	10.15962	18
43	9.75551	9.91486	10.08514	10.24449	9.84065	10.15935	17
44	9.75569	9.91477	10.08523	10.24431	9.84092	10.15908	16
45	9.75587	9.91469	10.08531	10.24413	9.84119	10.15881	15
46	9.75605	9.91460	10.08540	10.24395	9.84146	10.15854	14
47	9.75624	9.91451	10.08549	10.24376	9.84173	10.15827	13
48	9.75642	9.91442	10.08558	10.24358	9.84200	10.15800	12
49	9.75660	9.91433	10.08567	10.24340	9.84227	10.15773	11
50	9.75678	9.91425	10.08575	10.24322	9.84254	10.15746	10
51	9.75696	9.91416	10.08584	10.24304	9.84280	10.15720	9
52	9.75714	9.91407	10.08593	10.24286	9.84307	10.15693	8
53	9.75733	9.91398	10.08602	10.24267	9.84334	10.15666	7
54	9.75751	9.91389	10.08611	10.24249	9.84361	10.15639	6
55	9.75769	9.91381	10.08619	10.24231	9.84388	10.15612	5
56	9.75787	9.91372	10.08628	10.24213	9.84415	10.15585	4
57	9.75805	9.91363	10.08637	10.24195	9.84442	10.15558	3
58	9.75823	9.91354	10.08646	10.24177	9.84469	10.15531	2
59	9.75841	9.91345	10.08655	10.24159	9.84496	10.15504	1
60	9.75859	9.91336	10.08664	10.24141	9.84523	10.15477	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

55°

35°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.75859	9.91336	10.08664	10.24141	9.84523	10.15477	60
1	9.75877	9.91328	10.08672	10.24123	9.84550	10.15450	59
2	9.75895	9.91319	10.08681	10.24105	9.84576	10.15424	58
3	9.75913	9.91310	10.08690	10.24087	9.84603	10.15397	57
4	9.75931	9.91301	10.08699	10.24069	9.84630	10.15370	56
5	9.75949	9.91292	10.08708	10.24051	9.84657	10.15343	55
6	9.75967	9.91283	10.08717	10.24033	9.84684	10.15316	54
7	9.75985	9.91274	10.08726	10.24015	9.84711	10.15289	53
8	9.76003	9.91266	10.08734	10.23997	9.84738	10.15262	52
9	9.76021	9.91257	10.08743	10.23979	9.84764	10.15236	51
10	9.76039	9.91248	10.08752	10.23961	9.84791	10.15209	50
11	9.76057	9.91239	10.08761	10.23943	9.84818	10.15182	49
12	9.76075	9.91230	10.08770	10.23925	9.84845	10.15155	48
13	9.76093	9.91221	10.08779	10.23907	9.84872	10.15128	47
14	9.76111	9.91212	10.08788	10.23889	9.84899	10.15101	46
15	9.76129	9.91203	10.08797	10.23871	9.84925	10.15075	45
16	9.76146	9.91194	10.08806	10.23854	9.84952	10.15048	44
17	9.76164	9.91185	10.08815	10.23836	9.84979	10.15021	43
18	9.76182	9.91176	10.08824	10.23818	9.85006	10.14994	42
19	9.76200	9.91167	10.08833	10.23800	9.85033	10.14967	41
20	9.76218	9.91158	10.08842	10.23782	9.85059	10.14941	40
21	9.76236	9.91149	10.08851	10.23764	9.85086	10.14914	39
22	9.76253	9.91141	10.08859	10.23747	9.85113	10.14887	38
23	9.76271	9.91132	10.08868	10.23729	9.85140	10.14860	37
24	9.76289	9.91123	10.08877	10.23711	9.85166	10.14834	36
25	9.76307	9.91114	10.08886	10.23693	9.85193	10.14807	35
26	9.76324	9.91105	10.08895	10.23676	9.85220	10.14780	34
27	9.76342	9.91096	10.08904	10.23658	9.85247	10.14753	33
28	9.76360	9.91087	10.08913	10.23640	9.85273	10.14727	32
29	9.76378	9.91078	10.08922	10.23622	9.85300	10.14700	31
30	9.76395	9.91069	10.08931	10.23605	9.85327	10.14673	30
31	9.76413	9.91060	10.08940	10.23587	9.85354	10.14646	29
32	9.76431	9.91051	10.08949	10.23569	9.85380	10.14620	28
33	9.76448	9.91042	10.08958	10.23552	9.85407	10.14593	27
34	9.76466	9.91033	10.08967	10.23534	9.85434	10.14566	26
35	9.76484	9.91023	10.08977	10.23516	9.85460	10.14540	25
36	9.76501	9.91014	10.08986	10.23499	9.85487	10.14513	24
37	9.76519	9.91005	10.08995	10.23481	9.85514	10.14486	23
38	9.76537	9.90996	10.09004	10.23463	9.85540	10.14460	22
39	9.76554	9.90987	10.09013	10.23446	9.85567	10.14433	21
40	9.76572	9.90978	10.09022	10.23428	9.85594	10.14406	20
41	9.76590	9.90969	10.09031	10.23410	9.85620	10.14380	19
42	9.76607	9.90960	10.09040	10.23393	9.85647	10.14353	18
43	9.76625	9.90951	10.09049	10.23375	9.85674	10.14326	17
44	9.76642	9.90942	10.09058	10.23358	9.85700	10.14300	16
45	9.76660	9.90933	10.09067	10.23340	9.85727	10.14273	15
46	9.76677	9.90924	10.09076	10.23323	9.85754	10.14246	14
47	9.76695	9.90915	10.09085	10.23305	9.85780	10.14220	13
48	9.76712	9.90906	10.09094	10.23288	9.85807	10.14193	12
49	9.76730	9.90896	10.09104	10.23270	9.85834	10.14166	11
50	9.76747	9.90887	10.09113	10.23253	9.85860	10.14140	10
51	9.76765	9.90878	10.09122	10.23235	9.85887	10.14113	9
52	9.76782	9.90869	10.09131	10.23218	9.85913	10.14087	8
53	9.76800	9.90860	10.09140	10.23200	9.85940	10.14060	7
54	9.76817	9.90851	10.09149	10.23183	9.85967	10.14033	6
55	9.76835	9.90842	10.09158	10.23165	9.85993	10.14007	5
56	9.76852	9.90832	10.09168	10.23148	9.86020	10.13980	4
57	9.76870	9.90823	10.09177	10.23130	9.86046	10.13954	3
58	9.76887	9.90814	10.09186	10.23113	9.86073	10.13927	2
59	9.76904	9.90805	10.09195	10.23096	9.86100	10.13900	1
60	9.76922	9.90796	10.09204	10.23078	9.86126	10.13874	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

36°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.76922	9.90796	10.09204	10.23078	9.86126	10.13874	60
1	9.76939	9.90787	10.09213	10.23061	9.86153	10.13847	59
2	9.76957	9.90777	10.09223	10.23043	9.86179	10.13821	58
3	9.76974	9.90768	10.09232	10.23026	9.86206	10.13794	57
4	9.76991	9.90759	10.09241	10.23009	9.86232	10.13768	56
5	9.77009	9.90750	10.09250	10.22991	9.86259	10.13741	55
6	9.77026	9.90741	10.09259	10.22974	9.86285	10.13715	54
7	9.77043	9.90731	10.09269	10.22957	9.86312	10.13688	53
8	9.77061	9.90722	10.09278	10.22939	9.86338	10.13662	52
9	9.77078	9.90713	10.09287	10.22922	9.86365	10.13635	51
10	9.77095	9.90704	10.09296	10.22905	9.86392	10.13608	50
11	9.77112	9.90694	10.09306	10.22888	9.86418	10.13582	49
12	9.77130	9.90685	10.09315	10.22870	9.86445	10.13555	48
13	9.77147	9.90676	10.09324	10.22853	9.86471	10.13529	47
14	9.77164	9.90667	10.09333	10.22836	9.86498	10.13502	46
15	9.77181	9.90657	10.09343	10.22819	9.86524	10.13476	45
16	9.77199	9.90648	10.09352	10.22801	9.86551	10.13449	44
17	9.77216	9.90639	10.09361	10.22784	9.86577	10.13423	43
18	9.77233	9.90630	10.09370	10.22767	9.86603	10.13397	42
19	9.77250	9.90620	10.09380	10.22750	9.86630	10.13370	41
20	9.77268	9.90611	10.09389	10.22732	9.86656	10.13344	40
21	9.77285	9.90602	10.09398	10.22715	9.86683	10.13317	39
22	9.77302	9.90592	10.09408	10.22698	9.86709	10.13291	38
23	9.77319	9.90583	10.09417	10.22681	9.86736	10.13264	37
24	9.77336	9.90574	10.09426	10.22664	9.86762	10.13238	36
25	9.77353	9.90565	10.09435	10.22647	9.86789	10.13211	35
26	9.77370	9.90555	10.09445	10.22630	9.86815	10.13185	34
27	9.77387	9.90546	10.09454	10.22613	9.86842	10.13158	33
28	9.77405	9.90537	10.09463	10.22595	9.86868	10.13132	32
29	9.77422	9.90527	10.09473	10.22578	9.86894	10.13106	31
30	9.77439	9.90518	10.09482	10.22561	9.86921	10.13079	30
31	9.77456	9.90509	10.09491	10.22544	9.86947	10.13053	29
32	9.77473	9.90499	10.09501	10.22527	9.86974	10.13026	28
33	9.77490	9.90490	10.09510	10.22510	9.87000	10.13000	27
34	9.77507	9.90480	10.09520	10.22493	9.87027	10.12973	26
35	9.77524	9.90471	10.09529	10.22476	9.87053	10.12947	25
36	9.77541	9.90462	10.09538	10.22459	9.87079	10.12921	24
37	9.77558	9.90452	10.09548	10.22442	9.87106	10.12894	23
38	9.77575	9.90443	10.09557	10.22425	9.87132	10.12868	22
39	9.77592	9.90434	10.09566	10.22408	9.87158	10.12842	21
40	9.77609	9.90424	10.09576	10.22391	9.87185	10.12815	20
41	9.77626	9.90415	10.09585	10.22374	9.87211	10.12789	19
42	9.77643	9.90405	10.09595	10.22357	9.87238	10.12762	18
43	9.77660	9.90396	10.09604	10.22340	9.87264	10.12736	17
44	9.77677	9.90386	10.09614	10.22323	9.87290	10.12710	16
45	9.77694	9.90377	10.09623	10.22306	9.87317	10.12683	15
46	9.77711	9.90368	10.09632	10.22289	9.87343	10.12657	14
47	9.77728	9.90358	10.09642	10.22272	9.87369	10.12631	13
48	9.77744	9.90349	10.09651	10.22256	9.87396	10.12604	12
49	9.77761	9.90339	10.09661	10.22239	9.87422	10.12578	11
50	9.77778	9.90330	10.09670	10.22222	9.87448	10.12552	10
51	9.77795	9.90320	10.09680	10.22205	9.87475	10.12525	9
52	9.77812	9.90311	10.09689	10.22188	9.87501	10.12499	8
53	9.77829	9.90301	10.09699	10.22171	9.87527	10.12473	7
54	9.77846	9.90292	10.09708	10.22154	9.87554	10.12446	6
55	9.77862	9.90282	10.09718	10.22138	9.87580	10.12420	5
56	9.77879	9.90273	10.09727	10.22121	9.87606	10.12394	4
57	9.77896	9.90263	10.09737	10.22104	9.87633	10.12367	3
58	9.77913	9.90254	10.09746	10.22087	9.87659	10.12341	2
59	9.77930	9.90244	10.09756	10.22070	9.87685	10.12315	1
60	9.77946	9.90235	10.09765	10.22054	9.87711	10.12289	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

37°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.77946	9.90235	10.09765	10.22054	9.87711	10.12289	60
1	9.77963	9.90225	10.09775	10.22037	9.87738	10.12262	59
2	9.77980	9.90216	10.09784	10.22020	9.87764	10.12236	58
3	9.77997	9.90206	10.09794	10.22003	9.87790	10.12210	57
4	9.78013	9.90197	10.09803	10.21987	9.87817	10.12183	56
5	9.78030	9.90187	10.09813	10.21970	9.87843	10.12157	55
6	9.78047	9.90178	10.09822	10.21953	9.87869	10.12131	54
7	9.78063	9.90168	10.09832	10.21937	9.87895	10.12105	53
8	9.78080	9.90159	10.09841	10.21920	9.87922	10.12078	52
9	9.78097	9.90149	10.09851	10.21903	9.87948	10.12052	51
10	9.78113	9.90139	10.09861	10.21887	9.87974	10.12026	50
11	9.78130	9.90130	10.09870	10.21870	9.88000	10.12000	49
12	9.78147	9.90120	10.09880	10.21853	9.88027	10.11973	48
13	9.78163	9.90111	10.09889	10.21837	9.88053	10.11947	47
14	9.78180	9.90101	10.09899	10.21820	9.88079	10.11921	46
15	9.78197	9.90091	10.09909	10.21803	9.88105	10.11895	45
16	9.78213	9.90082	10.09918	10.21787	9.88131	10.11869	44
17	9.78230	9.90072	10.09928	10.21770	9.88158	10.11842	43
18	9.78246	9.90063	10.09937	10.21754	9.88184	10.11816	42
19	9.78263	9.90053	10.09947	10.21737	9.88210	10.11790	41
20	9.78280	9.90043	10.09957	10.21720	9.88236	10.11764	40
21	9.78296	9.90034	10.09966	10.21704	9.88262	10.11738	39
22	9.78313	9.90024	10.09976	10.21687	9.88289	10.11711	38
23	9.78329	9.90014	10.09986	10.21671	9.88315	10.11685	37
24	9.78346	9.90005	10.09995	10.21654	9.88341	10.11659	36
25	9.78362	9.89995	10.10005	10.21638	9.88367	10.11633	35
26	9.78379	9.89985	10.10015	10.21621	9.88393	10.11607	34
27	9.78395	9.89976	10.10024	10.21605	9.88420	10.11580	33
28	9.78412	9.89966	10.10034	10.21588	9.88446	10.11554	32
29	9.78428	9.89956	10.10044	10.21572	9.88472	10.11528	31
30	9.78445	9.89947	10.10053	10.21555	9.88498	10.11502	30
31	9.78461	9.89937	10.10063	10.21539	9.88524	10.11476	29
32	9.78478	9.89927	10.10073	10.21522	9.88550	10.11450	28
33	9.78494	9.89918	10.10082	10.21506	9.88577	10.11423	27
34	9.78510	9.89908	10.10092	10.21490	9.88603	10.11397	26
35	9.78527	9.89898	10.10102	10.21473	9.88629	10.11371	25
36	9.78543	9.89888	10.10112	10.21457	9.88655	10.11345	24
37	9.78560	9.89879	10.10121	10.21440	9.88681	10.11319	23
38	9.78576	9.89869	10.10131	10.21424	9.88707	10.11293	22
39	9.78592	9.89859	10.10141	10.21408	9.88733	10.11267	21
40	9.78609	9.89849	10.10151	10 21391	9.88759	10.11241	20
41	9.78625	9.89840	10.10160	10.21375	9.88786	10.11214	19
42	9.78642	9.89830	10.10170	10.21358	9.88812	10.11188	18
43	9.78658	9.89820	10.10180	10.21342	9.88838	10.11162	17
44	9.78674	9.89810	10.10190	10.21326	9.88864	10.11136	16
45	9.78691	9.89801	10.10199	10.21309	9.88890	10.11110	15
46	9.78707	9.89791	10.10209	10.21293	9.88916	10.11084	14
47	9.78723	9.89781	10.10219	10.21277	9.88942	10.11058	13
48	9.78739	9.89771	10.10229	10.21261	9.88968	10.11032	12
49	9.78756	9.89761	10.10239	10.21244	9.88994	10.11006	11
50	9.78772	9.89752	10.10248	10.21228	9.89020	10.10980	10
51	9.78788	9 89742	10.10258	10.21212	9.89046	10.10954	9
52	9.78805	9.89732	10.10268	10.21195	9.89073	10.10927	8
53	9.78821	9.89722	10.10278	10.21179	9.89099	10.10901	7
54	9.78837	9.89712	10.10288	10.21163	9.89125	10.10875	6
55	9.78853	9.89702	10.10298	10.21147	9.89151	10.10849	5
56	9.78869	9.89693	10.10307	10.21131	9.89177	10.10823	4
57	9.78886	9.89683	10.10317	10.21114	9.89203	10.10797	3
58	9.78902	9.89673	10.10327	10.21098	9.89229	10.10771	2
59	9.78918	9.89663	10.10337	10.21082	9.89255	10.10745	1
60	9.78934	9.89653	10.10347	10.21066	9.89281	10.10719	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

52°

38°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.78934	9.89653	10.10347	10.21066	9.89281	10.10719	60
1	9.78950	9.89643	10.10357	10.21050	9.89307	10.10693	59
2	9.78967	9.89633	10.10367	10.21033	9.89333	10.10667	58
3	9.78983	9.89624	10.10376	10.21017	9.89359	10.10641	57
4	9.78999	9.89614	10.10386	10.21001	9.89385	10.10615	56
5	9.79015	9.89604	10.10396	10.20985	9.89411	10.10589	55
6	9.79031	9.89594	10.10406	10.20969	9.89437	10.10563	54
7	9.79047	9.89584	10.10416	10.20953	9.89463	10.10537	53
8	9.79063	9.89574	10.10426	10.20937	9.89489	10.10511	52
9	9.79079	9.89564	10.10436	10.20921	9.89515	10.10485	51
10	9.79095	9.89554	10.10446	10.20905	9.89541	10.10459	50
11	9.79111	9.89544	10.10456	10.20889	9.89567	10.10433	49
12	9.79128	9.89534	10.10466	10.20872	9.89593	10.10407	48
13	9.79144	9.89524	10.10476	10.20856	9.89619	10.10381	47
14	9.79160	9.89514	10.10486	10.20840	9.89645	10.10355	46
15	9.79176	9.89504	10.10496	10.20824	9.89671	10.10329	45
16	9.79192	9.89495	10.10505	10.20808	9.89697	10.10303	44
17	9.79208	9.89485	10.10515	10.20792	9.89723	10.10277	43
18	9.79224	9.89475	10.10525	10.20776	9.89749	10.10251	42
19	9.79240	9.89465	10.10535	10.20760	9.89775	10.10225	41
20	9.79256	9.89455	10.10545	10.20744	9.89801	10.10199	40
21	9.79272	9.89445	10.10555	10.20728	9.89827	10.10173	39
22	9.79288	9.89435	10.10565	10.20712	9.89853	10.10147	38
23	9.79304	9.89425	10.10575	10.20696	9.89879	10.10121	37
24	9.79319	9.89415	10.10585	10.20681	9.89905	10.10095	36
25	9.79335	9.89405	10.10595	10.20665	9.89931	10.10069	35
26	9.79351	9.89395	10.10605	10.20649	9.89957	10.10043	34
27	9.79367	9.89385	10.10615	10.20633	9.89983	10.10017	33
28	9.79383	9.89375	10.10625	10.20617	9.90009	10.09991	32
29	9.79399	9.89364	10.10636	10.20601	9.90035	10.09965	31
30	9.79415	9.89354	10.10646	10.20585	9.90061	10.09939	30
31	9.79431	9.89344	10.10656	10.20569	9.90086	10.09914	29
32	9.79447	9.89334	10.10666	10.20553	9.90112	10.09888	28
33	9.79463	9.89324	10.10676	10.20537	9.90138	10.09862	27
34	9.79478	9.89314	10.10686	10.20522	9.90164	10.09836	26
35	9.79494	9.89304	10.10696	10.20506	9.90190	10.09810	25
36	9.79510	9.89294	10.10706	10.20490	9.90216	10.09784	24
37	9.79526	9.89284	10.10716	10.20474	9.90242	10.09758	23
38	9.79542	9.89274	10.10726	10.20458	9.90268	10.09732	22
39	9.79558	9.89264	10.10736	10.20442	9.90294	10.09706	21
40	9.79573	9.89254	10.10746	10.20427	9.90320	10.09680	20
41	9.79589	9.89244	10.10756	10.20411	9.90346	10.09654	19
42	9.79605	9.89233	10.10767	10.20395	9.90371	10.09629	18
43	9.79621	9.89223	10.10777	10.20379	9.90397	10.09603	17
44	9.79636	9.89213	10.10787	10.20364	9.90423	10.09577	16
45	9.79652	9.89203	10.10797	10.20348	9.90449	10.09551	15
46	9.79668	9.89193	10.10807	10.20332	9.90475	10.09525	14
47	9.79684	9.89183	10.10817	10.20316	9.90501	10.09499	13
48	9.79699	9.89173	10.10827	10.20301	9.90527	10.09473	12
49	9.79715	9.89162	10.10838	10.20285	9.90553	10.09447	11
50	9.79731	9.89152	10.10848	10.20269	9.90578	10.09422	10
51	9.79746	9.89142	10.10858	10.20254	9.90604	10.09396	9
52	9.79762	9.89132	10.10868	10.20238	9.90630	10.09370	8
53	9.79778	9.89122	10.10878	10.20222	9.90656	10.09344	7
54	9.79793	9.89112	10.10888	10.20207	9.90682	10.09318	6
55	9.79809	9.89101	10.10899	10.20191	9.90708	10.09292	5
56	9.79825	9.89091	10.10909	10.20175	9.90734	10.09266	4
57	9.79840	9.89081	10.10919	10.20160	9.90759	10.09241	3
58	9.79856	9.89071	10.10929	10.20144	9.90785	10.09215	2
59	9.79872	9.89060	10.10940	10.20128	9.90811	10.09189	1
60	9.79887	9.89050	10.10950	10.20113	9.90837	10.09163	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

39°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.79887	9.89050	10.10950	10.20113	9.90837	10.09163	60
1	9.79903	9.89040	10.10960	10.20097	9.90863	10.09137	59
2	9.79918	9.89030	10.10970	10.20082	9.90889	10.09111	58
3	9.79934	9.89020	10.10980	10.20066	9.90914	10.09086	57
4	9.79950	9.89009	10.10991	10.20050	9.90940	10.09060	56
5	9.79965	9.88999	10.11001	10.20035	9.90966	10.09034	55
6	9.79981	9.88989	10.11011	10.20019	9.90992	10.09008	54
7	9.79996	9.88978	10.11022	10.20004	9.91018	10.08982	53
8	9.80012	9.88968	10.11032	10.19988	9.91043	10.08957	52
9	9.80027	9.88958	10.11042	10.19973	9.91069	10.08931	51
10	9.80043	9.88948	10.11052	10.19957	9.91095	10.08905	50
11	9.80058	9.88937	10.11063	10.19942	9.91121	10.08879	49
12	9.80074	9.88927	10.11073	10.19926	9.91147	10.08853	48
13	9.80089	9.88917	10.11083	10.19911	9.91172	10.08828	47
14	9.80105	9.88906	10.11094	10.19895	9.91198	10.08802	46
15	9.80120	9.88896	10.11104	10.19880	9.91224	10.08776	45
16	9.80136	9.88886	10.11114	10.19864	9.91250	10.08750	44
17	9.80151	9.88875	10.11125	10.19849	9.91276	10.08724	43
18	9.80166	9.88865	10.11135	10.19834	9.91301	10.08699	42
19	9.80182	9.88855	10.11145	10.19818	9.91327	10.08673	41
20	9.80197	9.88844	10.11156	10.19803	9.91353	10.08647	40
21	9.80213	9.88834	10.11166	10.19787	9.91379	10.08621	39
22	9.80228	9.88824	10.11176	10.19772	9.91404	10.08596	38
23	9.80244	9.88813	10.11187	10.19756	9.91430	10.08570	37
24	9.80259	9.88803	10.11197	10.19741	9.91456	10.08544	36
25	9.80274	9.88793	10.11207	10.19726	9.91482	10.08518	35
26	9.80290	9.88782	10.11218	10.19710	9.91507	10.08493	34
27	9.80305	9.88772	10.11228	10.19695	9.91533	10.08467	33
28	9.80320	9.88761	10.11239	10.19680	9.91559	10.08441	32
29	9.80336	9.88751	10.11249	10.19664	9.91585	10.08415	31
30	9.80351	9.88741	10.11259	10.19649	9.91610	10.08390	30
31	9.80366	9.88730	10.11270	10.19634	9.91636	10.08364	29
32	9.80382	9.88720	10.11280	10.19618	9.91662	10.08338	28
33	9.80397	9.88709	10.11291	10.19603	9.91688	10.08312	27
34	9.80412	9.88699	10.11301	10.19588	9.91713	10.08287	26
35	9.80428	9.88688	10.11312	10.19572	9.91739	10.08261	25
36	9.80443	9.88678	10.11322	10.19557	9.91765	10.08235	24
37	9.80458	9.88668	10.11332	10.19542	9.91791	10.08209	23
38	9.80473	9.88657	10.11343	10.19527	9.91816	10.08184	22
39	9.80489	9.88647	10.11353	10.19511	9.91842	10.08158	21
40	9.80504	9.88636	10.11364	10.19496	9.91868	10.08132	20
41	9.80519	9.88626	10.11374	10.19481	9.91893	10.08107	19
42	9.80534	9.88615	10.11385	10.19466	9.91919	10.08081	18
43	9.80550	9.88605	10.11395	10.19450	9.91945	10.08055	17
44	9.80565	9.88594	10.11406	10.19435	9.91971	10.08029	16
45	9.80580	9.88584	10.11416	10.19420	9.91996	10.08004	15
46	9.80595	9.88573	10.11427	10.19405	9.92022	10.07978	14
47	9.80610	9.88563	10.11437	10.19390	9.92048	10.07952	13
48	9.80625	9.88552	10.11448	10.19375	9.92073	10.07927	12
49	9.80641	9.88542	10.11458	10.19359	9.92099	10.07901	11
50	9.80656	9.88531	10.11469	10.19344	9.92125	10.07875	10
51	9.80671	9.88521	10.11479	10.19329	9.92150	10.07850	9
52	9.80686	9.88510	10.11490	10.19314	9.92176	10.07824	8
53	9.80701	9.88499	10.11501	10.19299	9.92202	10.07798	7
54	9.80716	9.88489	10.11511	10.19284	9.92227	10.07773	6
55	9.80731	9.88478	10.11522	10.19269	9.92253	10.07747	5
56	9.80746	9.88468	10.11532	10.19254	9.92279	10.07721	4
57	9.80762	9.88457	10.11543	10.19238	9.92304	10.07696	3
58	9.80777	9.88447	10.11553	10.19223	9.92330	10.07670	2
59	9.80792	9.88436	10.11564	10.19208	9.92356	10.07644	1
60	9.80807	9.88425	10.11575	10.19193	9.92381	10.07619	0
′	Co-sine	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

50°

40°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.80807	9.88425	10.11575	10.19193	9.92381	10.07619	60
1	9.80822	9.88415	10.11585	10.19178	9.92407	10.07593	59
2	9.80837	9.88404	10.11596	10.19163	9.92433	10.07567	58
3	9.80852	9.88394	10.11606	10.19148	9.92458	10.07542	57
4	9.80867	9.88383	10.11617	10.19133	9.92484	10.07516	56
5	9.80882	9.88372	10.11628	10.19118	9.92510	10.07490	55
6	9.80897	9.88362	10.11638	10.19103	9.92535	10.07465	54
7	9.80912	9.88351	10.11649	10.19088	9.92561	10.07439	53
8	9.80927	9.88340	10.11660	10.19073	9.92587	10.07413	52
9	9.80942	9.88330	10.11670	10.19058	9.92612	10.07388	51
10	9.80957	9.88319	10.11681	10.19043	9.92638	10.07362	50
11	9.80972	9.88308	10.11692	10.19028	9.92663	10.07337	49
12	9.80987	9.88298	10.11702	10.19013	9.92689	10.07311	48
13	9.81002	9.88287	10.11713	10.18998	9.92715	10.07285	47
14	9.81017	9.88276	10.11724	10.18983	9.92740	10.07260	46
15	9.81032	9.88266	10.11734	10.18968	9.92766	10.07234	45
16	9.81047	9.88255	10.11745	10.18953	9.92792	10.07208	44
17	9.81061	9.88244	10.11756	10.18939	9.92817	10.07183	43
18	9.81076	9.88234	10.11766	10.18924	9.92843	10.07157	42
19	9.81091	9.88223	10.11777	10.18909	9.92868	10.07132	41
20	9.81106	9.88212	10.11788	10.18894	9.92894	10.07106	40
21	9.81121	9.88201	10.11799	10.18879	9.92920	10.07080	39
22	9.81136	9.88191	10.11809	10.18864	9.92945	10.07055	38
23	9.81151	9.88180	10.11820	10.18849	9.92971	10.07029	37
24	9.81166	9.88169	10.11831	10.18834	9.92996	10.07004	36
25	9.81180	9.88158	10.11842	10.18820	9.93022	10.06978	35
26	9.81195	9.88148	10.11852	10.18805	9.93048	10.06952	34
27	9.81210	9.88137	10.11863	10.18790	9.93073	10.06927	33
28	9.81225	9.88126	10.11874	10.18775	9.93099	10.06901	32
29	9.81240	9.88115	10.11885	10.18760	9.93124	10.06876	31
30	9.81254	9.88105	10.11895	10.18746	9.93150	10.06850	30
31	9.81269	9.88094	10.11906	10.18731	9.93175	10.06825	29
32	9.81284	9.88083	10.11917	10.18716	9.93201	10.06799	28
33	9.81299	9.88072	10.11928	10.18701	9.93227	10.06773	27
34	9.81314	9.88061	10.11939	10.18686	9.93252	10.06748	26
35	9.81328	9.88051	10.11949	10.18672	9.93278	10.06722	25
36	9.81343	9.88040	10.11960	10.18657	9.93303	10.06697	24
37	9.81358	9.88029	10.11971	10.18642	9.93329	10.06671	23
38	9.81372	9.88018	10.11982	10.18628	9.93354	10.06646	22
39	9.81387	9.88007	10.11993	10.18613	9.93380	10.06620	21
40	9.81402	9.87996	10.12004	10.18598	9.93406	10.06594	20
41	9.81417	9.87985	10.12015	10.18583	9.93431	10.06569	19
42	9.81431	9.87975	10.12025	10.18569	9.93457	10.06543	18
43	9.81446	9.87964	10.12036	10.18554	9.93482	10.06518	17
44	9.81461	9.87953	10.12047	10.18539	9.93508	10.06492	16
45	9.81475	9.87942	10.12058	10.18525	9.93533	10.06467	15
46	9.81490	9.87931	10.12069	10.18510	9.93559	10.06441	14
47	9.81505	9.87920	10.12080	10.18495	9.93584	10.06416	13
48	9.81519	9.87909	10.12091	10.18481	9.93610	10.06390	12
49	9.81534	9.87898	10.12102	10.18466	9.93636	10.06364	11
50	9.81549	9.87887	10.12113	10.18451	9.93661	10.06339	10
51	9.81563	9.87877	10.12123	10.18437	9.93687	10.06313	9
52	9.81578	9.87866	10.12134	10.18422	9.93712	10.06288	8
53	9.81592	9.87855	10.12145	10.18408	9.93738	10.06262	7
54	9.81607	9.87844	10.12156	10.18393	9.93763	10.06237	6
55	9.81622	9.87833	10.12167	10.18378	9.93789	10.06211	5
56	9.81636	9.87822	10.12178	10.18364	9.93814	10.06186	4
57	9.81651	9.87811	10.12189	10.18349	9.93840	10.06160	3
58	9.81665	9.87800	10.12200	10.18335	9.93865	10.06135	2
59	9.81680	9.87789	10.12211	10.18320	9.93891	10.06109	1
60	9.81694	9.87778	10.12222	10.18306	9.93916	10.06084	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

49°

41°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.81694	9.87778	10.12222	10.18306	9.93916	10.06084	60
1	9.81709	9.87767	10.12233	10.18291	9.93942	10.06058	59
2	9.81723	9.87756	10.12244	10.18277	9.93967	10.06033	58
3	9.81738	9.87745	10.12255	10.18262	9.93993	10.06007	57
4	9.81752	9.87734	10.12266	10.18248	9.94018	10.05982	56
5	9.81767	9.87723	10.12277	10.18233	9.94044	10.05956	55
6	9.81781	9.87712	10.12288	10.18219	9.94069	10.05931	54
7	9.81796	9.87701	10.12299	10.18204	9.94095	10.05905	53
8	9.81810	9.87690	10.12310	10.18190	9.94120	10.05880	52
9	9.81825	9.87679	10.12321	10.18175	9.94146	10.05854	51
10	9.81839	9.87668	10.12332	10.18161	9.94171	10.05829	50
11	9.81854	9.87657	10.12343	10.18146	9.94197	10.05803	49
12	9.81868	9.87646	10.12354	10.18132	9.94222	10.05778	48
13	9.81882	9.87635	10.12365	10.18118	9.94248	10.05752	47
14	9.81897	9.87624	10.12376	10.18103	9.94273	10.05727	46
15	9.81911	9.87613	10.12387	10.18089	9.94299	10.05701	45
16	9.81926	9.87601	10.12399	10.18074	9.94324	10.05676	44
17	9.81940	9.87590	10.12410	10.18060	9.94350	10.05650	43
18	9.81955	9.87579	10.12421	10.18045	9.94375	10.05625	42
19	9.81969	9.87568	10.12432	10.18031	9.94401	10.05599	41
20	9.81983	9.87557	10.12443	10.18017	9.94426	10.05574	40
21	9.81998	9.87546	10.12454	10.18002	9.94452	10.05548	39
22	9.82012	9.87535	10.12465	10.17988	9.94477	10.05523	38
23	9.82026	9.87524	10.12476	10.17974	9.94503	10.05497	37
24	9.82041	9.87513	10.12487	10.17959	9.94528	10.05472	36
25	9.82055	9.87501	10.12499	10.17945	9.94554	10.05446	35
26	9.82069	9.87490	10.12510	10.17931	9.94579	10.05421	34
27	9.82084	9.87479	10.12521	10.17916	9.94604	10.05396	33
28	9.82098	9.87468	10.12532	10.17902	9.94630	10.05370	32
29	9.82112	9.87457	10.12543	10.17888	9.94655	10.05345	31
30	9.82126	9.87446	10.12554	10.17874	9.94681	10.05319	30
31	9.82141	9.87434	10.12566	10.17859	9.94706	10.05294	29
32	9.82155	9.87423	10.12577	10.17845	9.94732	10.05268	28
33	9.82169	9.87412	10.12588	10.17831	9.94757	10.05243	27
34	9.82184	9.87401	10.12599	10.17816	9.94783	10.05217	26
35	9.82198	9.87390	10.12610	10.17802	9.94808	10.05192	25
36	9.82212	9.87378	10.12622	10.17788	9.94834	10.05166	24
37	9.82226	9.87367	10.12633	10.17774	9.94859	10.05141	23
38	9.82240	9.87356	10.12644	10.17760	9.94884	10.05116	22
39	9.82255	9.87345	10.12655	10.17745	9.94910	10.05090	21
40	9.82269	9.87334	10.12666	10.17731	9.94935	10.05065	20
41	9.82283	9.87322	10.12678	10.17717	9.94961	10.05039	19
42	9.82297	9.87311	10.12689	10.17703	9.94986	10.05014	18
43	9.82311	9.87300	10.12700	10.17689	9.95012	10.04988	17
44	9.82326	9.87288	10.12712	10.17674	9.95037	10.04963	16
45	9.82340	9.87277	10.12723	10.17660	9.95062	10.04938	15
46	9.82354	9.87266	10.12734	10.17646	9.95088	10.04912	14
47	9.82368	9.87255	10.12745	10.17632	9.95113	10.04887	13
48	9.82382	9.87243	10.12757	10.17618	9.95139	10.04861	12
49	9.82396	9.87232	10.12768	10.17604	9.95164	10.04836	11
50	9.82410	9.87221	10.12779	10.17590	9.95190	10.04810	10
51	9.82424	9.87209	10.12791	10.17576	9.95215	10.04785	9
52	9.82439	9.87198	10.12802	10.17561	9.95240	10.04760	8
53	9.82453	9.87187	10.12813	10.17547	9.95266	10.04734	7
54	9.82467	9.87175	10.12825	10.17533	9.95291	10.04709	6
55	9.82481	9.87164	10.12836	10.17519	9.95317	10.04683	5
56	9.82495	9.87153	10.12847	10.17505	9.95342	10.04658	4
57	9.82509	9.87141	10.12859	10.17491	9.95368	10.04632	3
58	9.82523	9.87130	10.12870	10.17477	9.95393	10.04607	2
59	9.82537	9.87119	10.12881	10.17463	9.95418	10.04582	1
60	9.82551	9.87107	10.12893	10.17449	9.95444	10.04556	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

48°

42°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.82551	9.87107	10.12893	10.17449	9.95444	10.04556	60
1	9.82565	9.87096	10.12904	10.17435	9.95469	10.04531	59
2	9.82579	9.87085	10.12915	10.17421	9.95495	10.04505	58
3	9.82593	9.87073	10.12927	10.17407	9.95520	10.04480	57
4	9.82607	9.87062	10.12938	10.17393	9.95545	10.04455	56
5	9.82621	9.87050	10.12950	10.17379	9.95571	10.04429	55
6	9.82635	9.87039	10.12961	10.17365	9.95596	10.04404	54
7	9.82649	9.87028	10.12972	10.17351	9.95622	10.04378	53
8	9.82663	9.87016	10.12984	10.17337	9.95647	10.04353	52
9	9.82677	9.87005	10.12995	10.17323	9.95672	10.04328	51
10	9.82691	9.86993	10.13007	10.17309	9.95698	10.04302	50
11	9.82705	9.86982	10.13018	10.17295	9.95723	10.04277	49
12	9.82719	9.86970	10.13030	10.17281	9.95748	10.04252	48
13	9.82733	9.86959	10.13041	10.17267	9.95774	10.04226	47
14	9.82747	9.86947	10.13053	10.17253	9.95799	10.04201	46
15	9.82761	9.86936	10.13064	10.17239	9.95825	10.04175	45
16	9.82775	9.86924	10.13076	10.17225	9.95850	10.04150	44
17	9.82788	9.86913	10.13087	10.17212	9.95875	10.04125	43
18	9.82802	9.86902	10.13098	10.17198	9.95901	10.04099	42
19	9.82816	9.86890	10.13110	10.17184	9.95926	10.04074	41
20	9.82830	9.86879	10.13121	10.17170	9.95952	10.04048	40
21	9.82844	9.86867	10.13133	10.17156	9.95977	10.04023	39
22	9.82858	9.86855	10.13145	10.17142	9.96002	10.03998	38
23	9.82872	9.86844	10.13156	10.17128	9.96028	10.03972	37
24	9.82885	9.86832	10.13168	10.17115	9.96053	10.03947	36
25	9.82899	9.86821	10.13179	10.17101	9.96078	10.03922	35
26	9.82913	9.86809	10.13191	10.17087	9.96104	10.03896	34
27	9.82927	9.86798	10.13202	10.17073	9.96129	10.03871	33
28	9.82941	9.86786	10.13214	10.17059	9.96155	10.03845	32
29	9.82955	9.86775	10.13225	10.17045	9.96180	10.03820	31
30	9.82968	9.86763	10.13237	10.17032	9.96205	10.03795	30
31	9.82982	9.86752	10.13248	10.17018	9.96231	10.03769	29
32	9.82996	9.86740	10.13260	10.17004	9.96256	10.03744	28
33	9.83010	9.86728	10.13272	10.16990	9.96281	10.03719	27
34	9.83023	9.86717	10.13283	10.16977	9.96307	10.01693	26
35	9.83037	9.86705	10.13295	10.16963	9.96332	10.03668	25
36	9.83051	9.86694	10.13306	10.16949	9.96357	10.03643	24
37	9.83065	9.86682	10.13318	10.16935	9.96383	10.03617	23
38	9.83078	9.86670	10.13330	10.16922	9.96408	10.03592	22
39	9.83092	9.86659	10.13341	10.16908	9.96433	10.03567	21
40	9.83106	9.86647	10.13353	10.16894	9.96459	10.03541	20
41	9.83120	9.86635	10.13365	10.16880	9.96484	10.03516	19
42	9.83133	9.86624	10.13376	10.16867	9.96510	10.03490	18
43	9.83147	9.86612	10.13388	10.16853	9.96535	10.03465	17
44	9.83161	9.86600	10.13400	10.16839	9.96560	10.03440	16
45	9.83174	9.86589	10.13411	10.16826	9.96586	10.03414	15
46	9.83188	9.86577	10.13423	10.16812	9.96611	10.03389	14
47	9.83202	9.86565	10.13435	10.16798	9.96636	10.03364	13
48	9.83215	9.86554	10.13446	10.16785	9.96662	10.03338	12
49	9.83229	9.86542	10.13458	10.16771	9.96687	10.03313	11
50	9.83242	9.86530	10.13470	10.16758	9.96712	10.03288	10
51	9.83256	9.86518	10.13482	10.16744	9.96738	10.03262	9
52	9.83270	9.86507	10.13493	10.16730	9.96763	10.03237	8
53	9.83283	9.86495	10.13505	10.16717	9.96788	10.03212	7
54	9.83297	9.86483	10.13517	10.16703	9.96814	10.03186	6
55	9.83310	9.86472	10.13528	10.16690	9.96839	10.03161	5
56	9.83324	9.86460	10.13540	10.16676	9.96864	10.03136	4
57	9.83338	9.86448	10.13552	10.16662	9.96890	10.03110	3
58	9.83351	9.86436	10.13564	10.16649	9.96915	10.03085	2
59	9.83365	9.86425	10.13575	10.16635	9.96940	10.03060	1
60	9.83378	9.86413	10.13587	10.16622	9.96966	10.03034	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

47°

43°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.83378	9.86413	10.13587	10.16622	9.96966	10.03034	60
1	9.83392	9.86401	10.13599	10.16608	9.96991	10.03009	59
2	9.83405	9.86389	10.13611	10.16595	9.97016	10.02984	58
3	9.83419	9.86377	10.13623	10.16581	9.97042	10.02958	57
4	9.83432	9.86366	10.13634	10.16568	9.97067	10.02933	56
5	9.83446	9.86354	10.13646	10.16554	9.97092	10.02908	55
6	9.83459	9.86342	10.13658	10.16541	9.97118	10.02882	54
7	9.83473	9.86330	10.13670	10.16527	9.97143	10.02857	53
8	9.83486	9.86318	10.13682	10.16514	9.97168	10.02832	52
9	9.83500	9.86306	10.13694	10.16500	9.97193	10.02807	51
10	9.83513	9.86295	10.13705	10.16487	9.97219	10.02781	50
11	9.83527	9.86283	10.13717	10.16473	9.97244	10.02756	49
12	9.83540	9.86271	10.13729	10.16460	9.97269	10.02731	48
13	9.83554	9.86259	10.13741	10.16446	9.97295	10.02705	47
14	9.83567	9.86247	10.13753	10.16433	9.97320	10.02680	46
15	9.83581	9.86235	10.13765	10.16419	9.97345	10.02655	45
16	9.83594	9.86223	10.13777	10.16406	9.97371	10.02629	44
17	9.83608	9.86211	10.13789	10.16392	9.97396	10.02604	43
18	9.83621	9.86200	10.13800	10.16379	9.97421	10.02579	42
19	9.83634	9.86188	10.13812	10.16366	9.97447	10.02553	41
20	9.83648	9.86176	10.13824	10.16352	9.97472	10.02528	40
21	9.83661	9.86164	10.13836	10.16339	9.97497	10.02503	39
22	9.83674	9.86152	10.13848	10.16326	9.97523	10.02477	38
23	9.83688	9.86140	10.13860	10.16312	9.97548	10.02452	37
24	9.83701	9.86128	10.13872	10.16299	9.97573	10.02427	36
25	9.83715	9.86116	10.13884	10.16285	9.97598	10.02402	35
26	9.83728	9.86104	10.13896	10.16272	9.97624	10.03376	34
27	9.83741	9.86092	10.13908	10.16259	9.97649	10.02351	33
28	9.83755	9.86080	10.13920	10.16245	9.97674	10.02326	32
29	9.83768	9.86068	10.13932	10.16232	9.97700	10.02300	31
30	9.83781	9.86056	10.13944	10.16219	9.97725	10.02275	30
31	9.83795	9.86044	10.13956	10.16205	9.97750	10.02250	29
32	9.83808	9.86032	10.13968	10.16192	9.97776	10.02224	28
33	9.83821	9.86020	10.13980	10.16179	9.97801	10.02199	27
34	9.83834	9.86008	10.13992	10.16166	9.97826	10.02174	26
35	9.83848	9.85996	10.14004	10.16152	9.97851	10.02149	25
36	9.83861	9.85984	10.14016	10.16139	9.97877	10.02123	24
37	9.83874	9.85972	10.14028	10.16126	9.97902	10.02098	23
38	9.83887	9.85960	10.14040	10.16113	9.97927	10.02073	22
39	9.83901	9.85948	10.14052	10.16099	9.97953	10.02047	21
40	9.83914	9.85936	10.14064	10.16086	9.97978	10.02022	20
41	9.83927	9.85924	10.14076	10.16073	9.98003	10.01997	19
42	9.83940	9.85912	10.14088	10.16060	9.98029	10.01971	18
43	9.83954	9.85900	10.14100	10.16046	9.98054	10.01946	17
44	9.83967	9.85888	10.14112	10.16033	9.98079	10.01921	16
45	9.83980	9.85876	10.14124	10.16020	9.98104	10.01896	15
46	9.83993	9.85864	10.14136	10.16007	9.98130	10.01870	14
47	9.84006	9.85851	10.14149	10.15994	9.98155	10.01845	13
48	9.84020	9.85839	10.14161	10.15980	9.98180	10.01820	12
49	9.84033	9.85827	10.14173	10.15967	9.98206	10.01794	11
50	9.84046	9.85815	10.14185	10.15954	9.98231	10.01769	10
51	9.84059	9.85803	10.14197	10.15941	9.98256	10.01744	9
52	9.84072	9.85791	10.14209	10.15928	9.98281	10.01719	8
53	9.84085	9.85779	10.14221	10.15915	9.98307	10.01693	7
54	9.84098	9.85766	10.14234	10.15902	9.98332	10.01668	6
55	9.84112	9.85754	10.14246	10.15888	9.98357	10.01643	5
56	9.84125	9.85742	10.14258	10.15875	9.98383	10.01617	4
57	9.84138	9.85730	10.14270	10.15862	9.98408	10.01592	3
58	9.84151	9.85718	10.14282	10.15849	9.98433	10.01567	2
59	9.84164	9.85706	10.14294	10.15836	9.98458	10.01542	1
60	9.84177	9.85693	10.14307	10.15823	9.98484	10.01516	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

46°

44°

′	Sine.	Co-sine.	Secant.	Co-secant.	Tangent.	Co-tang.	′
0	9.84177	9.85693	10.14307	10.15823	9.98484	10.01516	60
1	9.84190	9.85681	10.14319	10.15810	9.98509	10.01491	59
2	9.84203	9.85669	10.14331	10.15797	9.98534	10.01466	58
3	9.84216	9.85657	10.14343	10.15784	9.98560	10.01440	57
4	9.84229	9.85645	10.14355	10.15771	9.98585	10.01415	56
5	9.84242	9.85632	10.14368	10.15758	9.98610	10.01390	55
6	9.84255	9.85620	10.14380	10.15745	9.98635	10.01365	54
7	9.84269	9.85608	10.14392	10.15731	9.98661	10.01339	53
8	9.84282	9.85596	10.14404	10.15718	9.98686	10.01314	52
9	9.84295	9.85583	10.14417	10.15705	9.98711	10.01289	51
10	9.84308	9.85571	10.14429	10.15692	9.98737	10.01263	50
11	9.84321	9.85559	10.14441	10.15679	9.98762	10.01238	49
12	9.84334	9.85547	10.14453	10.15666	9.98787	10.01213	48
13	9.84347	9.85534	10.14466	10.15653	9.98812	10.01188	47
14	9.84360	9.85522	10.14478	10.15640	9.98838	10.01162	46
15	9.84373	9.85510	10.14490	10.15627	9.98863	10.01137	45
16	9.84385	9.85497	10.14503	10.15615	9.98888	10.01112	44
17	9.84398	9.85485	10.14515	10.15602	9.98913	10.01087	43
18	9.84411	9.85473	10.14527	10.15589	9.98939	10.01061	42
19	9.84424	9.85460	10.14540	10.15576	9.98964	10.01036	41
20	9.84437	9.85448	10.14552	10.15563	9.98989	10.01011	40
21	9.84450	9.85436	10.14564	10.15550	9.99015	10.00985	39
22	9.84463	9.85423	10.14577	10.15537	9.99040	10.00960	38
23	9.84476	9.85411	10.14589	10.15524	9.99065	10.00935	37
24	9.84489	9.85399	10.14601	10.15511	9.99090	10.00910	36
25	9.84502	9.85386	10.14614	10.15498	9.99116	10.00884	35
26	9.84515	9.85374	10.14626	10.15485	9.99141	10.00859	34
27	9.84528	9.85361	10.14639	10.15472	9.99166	10.00834	33
28	9.84540	9.85349	10.14651	10.15460	9.99191	10.00809	32
29	9.84553	9.85337	10.14663	10.15447	9.99217	10.00783	31
30	9.84566	9.85324	10.14676	10.15434	9.99242	10.00758	30
31	9.84579	9.85312	10.14688	10.15421	9.99267	10.00733	29
32	9.84592	9.85299	10.14701	10.15408	9.99293	10.00707	28
33	9.84605	9.85287	10.14713	10.15395	9.99318	10.00682	27
34	9.84618	9.85274	10.14726	10.15382	9.99343	10.00657	26
35	9.84630	9.85262	10.14738	10.15370	9.99368	10.00632	25
36	9.84643	9.85250	10.14750	10.15357	9.99394	10.00606	24
37	9.84656	9.85237	10.14763	10.15344	9.99419	10.00581	23
38	9.84669	9.85225	10.14775	10.15331	9.99444	10.00556	22
39	9.84682	9.85212	10.14788	10.15318	9.99469	10.00531	21
40	9.84694	9.85200	10.14800	10.15306	9.99495	10.00505	20
41	9.84707	9.85187	10.14813	10.15293	9.99520	10.00480	19
42	9.84720	9.85175	10.14825	10.15280	9.99545	10.00455	18
43	9.84733	9.85162	10.14838	10.15267	9.99570	10.00430	17
44	9.84745	9.85150	10.14850	10.15255	9.99596	10.00404	16
45	9.84758	9.85137	10.14863	10.15242	9.99621	10.00379	15
46	9.84771	9.85125	10.14875	10.15229	9.99646	10.00354	14
47	9.84784	9.85112	10.14888	10.15216	9.99672	10.00328	13
48	9.84796	9.85100	10.14900	10.15204	9.99697	10.00303	12
49	9.84809	9.85087	10.14913	10.15191	9.99722	10.00278	11
50	9.84822	9.85074	10.14926	10.15178	9.99747	10.00253	10
51	9.84835	9.85062	10.14938	10.15165	9.99773	10.00227	9
52	9.84847	9.85049	10.14951	10.15153	9.99798	10.00202	8
53	9.84860	9.85037	10.14963	10.15140	9.99823	10.00177	7
54	9.84873	9.85024	10.14976	10.15127	9.99848	10.00152	6
55	9.84885	9.85012	10.14988	10.15115	9.99874	10.00126	5
56	9.84898	9.84999	10.15001	10.15102	9.99899	10.00101	4
57	9.84911	9.84986	10.15014	10.15089	9.99924	10.00076	3
58	9.84923	9.84974	10.15026	10.15077	9.99949	10.00051	2
59	9.84936	9.84961	10.15039	10.15064	9.99975	10.00025	1
60	9.84949	9.84949	10.15051	10.15051	10.00000	10.00000	0
′	Co-sine.	Sine.	Co-secant.	Secant.	Co-tang.	Tangent.	′

TABLE X.

NATURAL SINES

TO EVERY DEGREE AND MINUTE

OF THE

QUADRANT.

TABLE X.—Natural Sines.

′	0°		1°		2°		3°		4°		′
	N.sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	
0	00000	100000	01745	99985	03490	99939	05234	99863	06976	99756	60
1	00029	100000	01774	99984	03519	99938	05263	99861	07005	99754	59
2	00058	100000	01803	99984	03548	99937	05292	99860	07034	99752	58
3	00087	100000	01832	99983	03577	99936	05321	99858	07063	99750	57
4	00116	100000	01862	99983	03606	99935	05350	99857	07092	99748	56
5	00145	100000	01891	99982	03635	99934	05379	99855	07121	99746	55
6	00175	100000	01920	99982	03664	99933	05408	99854	07150	99744	54
7	00204	100000	01949	99981	03693	99932	05437	99852	07179	99742	53
8	00233	100000	01978	99980	03723	99931	05466	99851	07208	99740	52
9	00262	100000	02007	99980	03752	99930	05495	99849	07237	99738	51
10	00291	100000	02036	99979	03781	99929	05524	99847	07266	99736	50
11	00320	99999	02065	99979	03810	99927	05553	99846	07295	99734	49
12	00349	99999	02094	99978	03839	99926	05582	99844	07324	99731	48
13	00378	99999	02123	99977	03868	99925	05611	99842	07353	99729	47
14	00407	99999	02152	99977	03897	99924	05640	99841	07382	99727	46
15	00436	99999	02181	99976	03926	99923	05669	99839	07411	99725	45
16	00465	99999	02211	99976	03955	99922	05698	99838	07440	99723	44
17	00495	99999	02240	99975	03984	99921	05727	99836	07469	99721	43
18	00524	99999	02269	99974	04013	99919	05756	99834	07498	99719	42
19	00553	99998	02298	99974	04042	99918	05785	99833	07527	99716	41
20	00582	99998	02327	99973	04071	99917	05814	99831	07556	99714	40
21	00611	99998	02356	99972	04100	99916	05844	99829	07585	99712	39
22	00640	99998	02385	99972	04129	99915	05873	99827	07614	99710	38
23	00669	99998	02414	99971	04159	99913	05902	99826	07643	99708	37
24	00698	99998	02443	99970	04188	99912	05931	99824	07672	99705	36
25	00727	99997	02472	99969	04217	99911	05960	99822	07701	99703	35
26	00756	99997	02501	99969	04246	99910	05989	99821	07730	99701	34
27	00785	99997	02530	99968	04275	99909	06018	99819	07759	99699	33
28	00814	99997	02560	99967	04304	99907	06047	99817	07788	99696	32
29	00844	99996	02589	99966	04333	99906	06076	99815	07817	99694	31
30	00873	99996	02618	99966	04362	99905	06105	99813	07846	99692	30
31	00902	99996	02647	99965	04391	99904	06134	99812	07875	99689	29
32	00931	99996	02676	99964	04420	99902	06163	99810	07904	99687	28
33	00960	99995	02705	99963	04449	99901	06192	99808	07933	99685	27
34	00989	99995	02734	99963	04478	99900	06221	99806	07962	99683	26
35	01018	99995	02763	99962	04507	99898	06250	99804	07991	99680	25
36	01047	99995	02792	99961	04536	99897	06279	99803	08020	99678	24
37	01076	99994	02821	99960	04565	99896	06308	99801	08049	99676	23
38	01105	99994	02850	99959	04594	99894	06337	99799	08078	99673	22
39	01134	99994	02879	99959	04623	99893	06366	99797	08107	99671	21
40	01164	99993	02908	99958	04653	99892	06395	99795	08136	99668	20
41	01193	99993	02938	99957	04682	99890	06424	99793	08165	99666	19
42	01222	99993	02967	99956	04711	99889	06453	99792	08194	99664	18
43	01251	99992	02996	99955	04740	99888	06482	99790	08223	99661	17
44	01280	99992	03025	99954	04769	99886	06511	99788	08252	99659	16
45	01309	99991	03054	99953	04798	99885	06540	99786	08281	99657	15
46	01338	99991	03083	99952	04827	99883	06569	99784	08310	99654	14
47	01367	99991	03112	99952	04856	99882	06598	99782	08339	99652	13
48	01396	99990	03141	99951	04885	99881	06627	99780	08368	99649	12
49	01425	99990	03170	99950	04914	99879	06656	99778	08397	99647	11
50	01454	99989	03199	99949	04943	99878	06685	99776	08426	99644	10
51	01483	99989	03228	99948	04972	99876	06714	99774	08455	99642	9
52	01513	99989	03257	99947	05001	99875	06743	99772	08484	99639	8
53	01542	99988	03286	99946	05030	99873	06773	99770	08513	99637	7
54	01571	99988	03316	99945	05059	99872	06802	99768	08542	99635	6
55	01600	99987	03345	99944	05088	99870	06831	99766	08571	99632	5
56	01629	99987	03374	99943	05117	99869	06860	99764	08600	99630	4
57	01658	99986	03403	99942	05146	99867	06889	99762	08629	99627	3
58	01687	99986	03432	99941	05175	99866	06918	99760	08658	99625	2
59	01716	99985	03461	99940	05205	99864	06947	99758	08687	99622	1
60	01745	99985	03490	99939	05234	99863	06976	99756	08716	99619	0
′	N. cos	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N.sine	′
	89°		88°		87°		86°		85°		

	5°		6°		7°		8°		9°		
′	N.sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	′
0	08716	99619	10453	99452	12187	99255	13917	99027	15643	98769	60
1	08745	99617	10482	99449	12216	99251	13946	99023	15672	98764	59
2	08774	99614	10511	99446	12245	99248	13975	99019	15701	98760	58
3	08803	99612	10540	99443	12274	99244	14004	99015	15730	98755	57
4	08831	99609	10569	99440	12302	99240	14033	99011	15758	98751	56
5	08860	99607	10597	99437	12331	99237	14061	99006	15787	98746	55
6	08889	99604	10626	99434	12360	99233	14090	99002	15816	98741	54
7	08918	99602	10655	99431	12389	99230	14119	98998	15845	98737	53
8	08947	99599	10684	99428	12418	99226	14148	98994	15873	98732	52
9	08976	99596	10713	99424	12447	99222	14177	98990	15902	98728	51
10	09005	99594	10742	99421	12476	99219	14205	98986	15931	98723	50
11	09034	99591	10771	99418	12504	99215	14234	98982	15959	98718	49
12	09063	99588	10800	99415	12533	99211	14263	98978	15988	98714	48
13	09092	99586	10829	99412	12562	99208	14292	98973	16017	98709	47
14	09121	99583	10858	99409	12591	99204	14320	98969	16046	98704	46
15	09150	99580	10887	99406	12620	99200	14349	98965	16074	98700	45
16	09179	99578	10916	99402	12649	99197	14378	98961	16103	98695	44
17	09208	99575	10945	99399	12678	99193	14407	98957	16132	98690	43
18	09237	99572	10973	99396	12706	99189	14436	98953	16161	98686	42
19	09266	99570	11002	99393	12735	99186	14464	98948	16189	98681	41
20	09295	99567	11031	99390	12764	99182	14493	98944	16218	98676	40
21	09324	99564	11060	99386	12793	99178	14522	98940	16246	98671	39
22	09353	99562	11089	99383	12822	99175	14551	98936	16275	98667	38
23	09382	99559	11118	99380	12851	99171	14580	98931	16304	98662	37
24	09411	99556	11147	99377	12880	99167	14608	98927	16333	98657	36
25	09440	99553	11176	99374	12908	99163	14637	98923	16361	98652	35
26	09469	99551	11205	99370	12937	99160	14666	98919	16390	98648	34
27	09498	99548	11234	99367	12966	99156	14695	98914	16419	98643	33
28	09527	99545	11263	99364	12995	99152	14723	98910	16447	98638	32
29	09556	99542	11291	99360	13024	99148	14752	98906	16476	98633	31
30	09585	99540	11320	99357	13053	99144	14781	98902	16505	98629	30
31	09614	99537	11349	99354	13081	99141	14810	98897	16533	98624	29
32	09642	99534	11378	99351	13110	99137	14838	98893	16562	98619	28
33	09671	99531	11407	99347	13139	99133	14867	98889	16591	98614	27
34	09700	99528	11436	99344	13168	99129	14896	98884	16620	98609	26
35	09729	99526	11465	99341	13197	99125	14925	98880	16648	98604	25
36	09758	99523	11494	99337	13226	99122	14954	98876	16677	98600	24
37	09787	99520	11523	99334	13254	99118	14982	98871	16706	98595	23
38	09816	99517	11552	99331	13283	99114	15011	98867	16734	98590	22
39	09845	99514	11580	99327	13312	99110	15040	98863	16763	98585	21
40	09874	99511	11609	99324	13341	99106	15069	98858	16792	98580	20
41	09903	99508	11638	99320	13370	99102	15097	98854	16820	98575	19
42	09932	99506	11667	99317	13399	99098	15126	98849	16849	98570	18
43	09961	99503	11696	99314	13427	99094	15155	98845	16878	98565	17
44	09990	99500	11725	99310	13456	99091	15184	98841	16906	98561	16
45	10019	99497	11754	99307	13485	99087	15212	98836	16935	98556	15
46	10048	99494	11783	99303	13514	99083	15241	98832	16964	98551	14
47	10077	99491	11812	99300	13543	99079	15270	98827	16992	98546	13
48	10106	99488	11840	99297	13572	99075	15299	98823	17021	98541	12
49	10135	99485	11869	99293	13600	99071	15327	98818	17050	98536	11
50	10164	99482	11898	99290	13629	99067	15356	98814	17078	98531	10
51	10192	99479	11927	99286	13658	99063	15385	98809	17107	98526	9
52	10221	99476	11956	99283	13687	99059	15414	98805	17136	98521	8
53	10250	99473	11985	99279	13716	99055	15442	98800	17164	98516	7
54	10279	99470	12014	99276	13744	99051	15471	98796	17193	98511	6
55	10308	99467	12043	99272	13773	99047	15500	98791	17222	98506	5
56	10337	99464	12071	99269	13802	99043	15529	98787	17250	98501	4
57	10366	99461	12100	99265	13831	99039	15557	98782	17279	98496	3
58	10395	99458	12129	99262	13860	99035	15586	98778	17308	98491	2
59	10424	99455	12158	99258	13889	99031	15615	98773	17336	98486	1
60	10453	99452	12187	99255	13917	99027	15643	98769	17365	98481	0
′	N. cos.	N. sine.	N. cos.	N. sine	N. cos.	N. sine.	N cos.	N. sine.	N. cos	N.sine	′
	84°		83°		82°		81°		80°		

′	10°		11°		12°		13°		14°		′
	N.sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	
0	17365	98481	19081	98163	20791	97815	22495	97437	24192	97030	60
1	17393	98476	19109	98157	20820	97809	22523	97430	24220	97023	59
2	17422	98471	19138	98152	20848	97803	22552	97424	24249	97015	58
3	17451	98466	19167	98146	20877	97797	22580	97417	24277	97008	57
4	17479	98461	19195	98140	20905	97791	22608	97411	24305	97001	56
5	17508	98455	19224	98135	20933	97784	22637	97404	24333	96994	55
6	17537	98450	19252	98129	20962	97778	22665	97398	24362	96987	54
7	17565	98445	19281	98124	20990	97772	22693	97391	24390	96980	53
8	17594	98440	19309	98118	21019	97766	22722	97384	24418	96973	52
9	17623	98435	19338	98112	21047	97760	22750	97378	24446	96966	51
10	17651	98430	19366	98107	21076	97754	22778	97371	24474	96959	50
11	17680	98425	19395	98101	21104	97748	22807	97365	24503	96952	49
12	17708	98420	19423	98096	21132	97742	22835	97358	24531	96945	48
13	17737	98414	19452	98090	21161	97735	22863	97351	24559	96937	47
14	17766	98409	19481	98084	21189	97729	22892	97345	24587	96930	46
15	17794	98404	19509	98079	21218	97723	22920	97338	24615	96923	45
16	17823	98399	19538	98073	21246	97717	22948	97331	24644	96916	44
17	17852	98394	19566	98067	21275	97711	22977	97325	24672	96909	43
18	17880	98389	19595	98061	21303	67705	23005	97318	24700	96902	42
19	17909	98383	19623	98056	21331	97698	23033	97311	24728	96894	41
20	17937	98378	19652	98050	21360	97692	23062	97304	24756	96887	40
21	17966	98373	19680	98044	21388	97686	23090	97298	24784	96880	39
22	17995	98368	19709	98039	21417	97680	23118	97291	24813	96873	38
23	18023	98362	19737	98033	21445	97673	23146	97284	24841	96866	37
24	18052	98357	19766	98027	21474	97667	23175	97278	24869	96858	36
25	18081	98352	19794	98021	21502	97661	23203	97271	24897	96851	35
26	18109	98347	19823	98016	21530	97655	23231	97264	24925	96844	34
27	18138	98341	19851	98010	21559	97648	23260	97257	24953	96837	33
28	18166	98336	19880	98004	21587	97642	23288	97251	24982	96829	32
29	18195	98331	19908	97998	21616	97636	23316	97244	25010	96822	31
30	18224	98325	19937	97992	21644	97630	23345	97237	25038	96815	30
31	18252	98320	19965	97987	21672	97623	23373	97230	25066	96807	29
32	18281	98315	19994	97981	21701	97617	23401	97223	25094	96800	28
33	18309	98310	20022	97975	21729	97611	23429	97217	25122	96793	27
34	18338	98304	20051	97969	21758	97604	23458	97210	25151	96786	26
35	18367	98299	20079	97963	21786	97598	23486	97203	25179	96778	25
36	18395	98294	20108	97958	21814	97592	23514	97196	25207	96771	24
37	18424	98288	20136	97952	21843	97585	23542	97189	25235	96764	23
38	18452	98283	20165	97946	21871	97579	23571	97182	25263	96756	22
39	18481	98277	20193	97940	21899	97573	23599	97176	25291	96749	21
40	18509	98272	20222	97934	21928	97566	23627	97169	25320	96742	20
41	18538	98267	20250	97928	21956	97560	23656	97162	25348	96734	19
42	18567	98261	20279	97922	21985	97553	23684	97155	25376	96727	18
43	18595	98256	20307	97916	22013	97547	23712	97148	25404	96719	17
44	18624	98250	20336	97910	22041	97541	23740	97141	25432	96712	16
45	18652	98245	20364	97905	22070	97534	23769	97134	25460	96705	15
46	18681	98240	20393	97899	22098	97528	23797	97127	25488	96697	14
47	18710	98234	20421	97893	22126	97521	23825	97120	25516	96690	13
48	18738	98229	20450	97887	22155	97515	23853	97113	25545	96682	12
49	18767	98223	20478	97881	22183	97508	23882	97106	25573	96675	11
50	18795	98218	20507	97875	22212	97502	23910	97100	25601	96667	10
51	18824	98212	20535	97869	22240	97496	23938	97093	25629	96660	9
52	18852	98207	20563	97863	22268	97489	23966	97086	25657	96653	8
53	18881	98201	20592	97857	22297	97483	23995	97079	25685	96645	7
54	18910	98196	20620	97851	22325	97476	24023	97072	25713	96638	6
55	18938	98190	20649	97845	22353	97470	24051	97065	25741	96630	5
56	18967	98185	20677	97839	22382	97463	24079	97058	25769	96623	4
57	18995	98179	20706	97833	22410	97457	24108	97051	25798	96615	3
58	19024	98174	20734	97827	22438	97450	24136	97044	25826	96608	2
59	19052	98168	20763	97821	22467	97444	24164	97037	25854	96600	1
60	19081	98163	20791	97815	22495	97437	24192	97030	25882	96593	0
′	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N.sine	′
	79°		78°		77°		76°		75°		

′	15° N.sine	15° N. cos.	16° N. sine.	16° N. cos.	17° N. sine.	17° N. cos.	18° N. sine.	18° N. cos.	19° N. sine.	19° N. cos.	′
0	25882	96593	27564	96126	29237	95630	30902	95106	32557	94552	60
1	25910	96585	27592	96118	29265	95622	30929	95097	32584	94542	59
2	25938	96578	27620	96110	29293	95613	30957	95088	32612	94533	58
3	25966	96570	27648	96102	29321	95605	30985	95079	32639	94523	57
4	25994	96562	27676	96094	29348	95596	31012	95070	32667	94514	56
5	26022	96555	27704	96086	29376	95588	31040	95061	32694	94504	55
6	26050	96547	27731	96078	29404	95579	31068	95052	32722	94495	54
7	26079	96540	27759	96070	29432	95571	31095	95043	32749	94485	53
8	26107	96532	27787	96062	29460	95562	31123	95033	32777	94476	52
9	26135	96524	27815	96054	29487	95554	31151	95024	32804	94466	51
10	26163	96517	27843	96046	29515	95545	31178	95015	32832	94457	50
11	26191	96509	27871	96037	29543	95536	31206	95006	32859	94447	49
12	26219	96502	27899	96029	29571	95528	31233	94997	32887	94438	48
13	26247	96494	27927	96021	29599	95519	31261	94988	32914	94428	47
14	26275	96486	27955	96013	29626	95511	31289	94979	32942	94418	46
15	26303	96479	27983	96005	29654	95502	31316	94970	32969	94409	45
16	26331	96471	28011	95997	29682	95493	31344	94961	32997	94399	44
17	26359	96463	28039	95989	29710	95485	31372	94952	33024	94390	43
18	26387	96456	28067	95981	29737	95476	31399	94943	33051	94380	42
19	26415	96448	28095	95972	29765	95467	31427	94933	33079	94370	41
20	26443	96440	28123	95964	29793	95459	31454	94924	33106	94361	40
21	26471	96433	28150	95956	29821	95450	31482	94915	33134	94351	39
22	26500	96425	28178	95948	29849	95441	31510	94906	33161	94342	38
23	26528	96417	28206	95940	29876	95433	31537	94897	33189	94332	37
24	26556	96410	28234	95931	29904	95424	31565	94888	33216	94322	36
25	26584	96402	28262	95923	29932	95415	31593	94878	33244	94313	35
26	26612	96394	28290	95915	29960	95407	31620	94869	33271	94303	34
27	26640	96386	28318	95907	29987	95398	31648	94860	33298	94293	33
28	26668	96379	28346	95898	30015	95389	31675	94851	33326	94284	32
29	26696	96371	28374	95890	30043	95380	31703	94842	33353	94274	31
30	26724	96363	28402	95882	30071	95372	31730	94832	33381	94264	30
31	26752	96355	28429	95874	30098	95363	31758	94823	33408	94254	29
32	26780	96347	28457	95865	30126	95354	31786	94814	33436	94245	28
33	26808	96340	28485	95857	30154	95345	31813	94805	33463	94235	27
34	26836	96332	28513	95849	30182	95337	31841	94795	33490	94225	26
35	26864	96324	28541	95841	30209	95328	31868	94786	33518	94215	25
36	26892	96316	28569	95832	30237	95319	31896	94777	33545	94206	24
37	26920	96308	28597	95824	30265	95310	31923	94768	33573	94196	23
38	26948	96301	28625	95816	30292	95301	31951	94758	33600	94186	22
39	26976	96293	28652	95807	30320	95293	31979	94749	33627	94176	21
40	27004	96285	28680	95799	30348	95284	32006	94740	33655	94167	20
41	27032	96277	28708	95791	30376	95275	32034	94730	33682	94157	19
42	27060	96269	28736	95782	30403	95266	32061	94721	33710	94147	18
43	27088	96261	28764	95774	30431	95257	32089	94712	33737	94137	17
44	27116	96253	28792	95766	30459	95248	32116	94702	33764	94127	16
45	27144	96246	28820	95757	30486	95240	32144	94693	33792	94118	15
46	27172	96238	28847	95749	30514	95231	32171	94684	33819	94108	14
47	27200	96230	28875	95740	30542	95222	32199	94674	33846	94098	13
48	27228	96222	28903	95732	30570	95213	32227	94665	33874	94088	12
49	27256	96214	28931	95724	30597	95204	32254	94656	33901	94078	11
50	27284	96206	28959	95715	30625	95195	32282	94646	33929	94068	10
51	27312	96198	28987	95707	30653	95186	32309	94637	33956	94058	9
52	27340	96190	29015	95698	30680	95177	32337	94627	33983	94049	8
53	27368	96182	29042	95690	30708	95168	32364	94618	34011	94039	7
54	27396	96174	29070	95681	30736	95159	32392	94609	34038	94029	6
55	27424	96166	29098	95673	30763	95150	32419	94599	34065	94019	5
56	27452	96158	29126	95664	30791	95142	32447	94590	34093	94009	4
57	27480	96150	29154	95656	30819	95133	32474	94580	34120	93999	3
58	27508	96142	29182	95647	30846	95124	32502	94571	34147	93989	2
59	27536	96134	29209	95639	30874	95115	32529	94561	34175	93979	1
60	27564	96126	29237	95630	30902	95106	32557	94552	34202	93969	0
′	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N.sine	′
	74°		73°		72°		71°		70°		

′	20°		21°		22°		23°		24°		′
	N. sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos	
0	34202	93969	35837	93358	37461	92718	39073	92050	40674	91355	60
1	34229	93959	35864	93348	37488	92707	39100	92039	40700	91343	59
2	34257	93949	35891	93337	37515	92697	39127	92028	40727	91331	58
3	34284	93939	35918	93327	37542	92686	39153	92016	40753	91319	57
4	34311	93929	35945	93316	37569	92675	39180	92005	40780	91307	56
5	34339	93919	35973	93306	37595	92664	39207	91994	40806	91295	55
6	34366	93909	36000	93295	37622	92653	39234	91982	40833	91283	54
7	34393	93899	36027	93285	37649	92642	39260	91971	40860	91272	53
8	34421	93889	36054	93274	37676	92631	39287	91959	40886	91260	52
9	34448	93879	36081	93264	37703	92620	39314	91948	40913	91248	51
10	34475	93869	36108	93253	37730	92609	39341	91936	40939	91236	50
11	34503	93859	36135	93243	37757	92598	39367	91925	40966	91224	49
12	34530	93849	36162	93232	37784	92587	39394	91914	40992	91212	48
13	34557	93839	36190	93222	37811	92576	39421	91902	41019	91200	47
14	34584	93829	36217	93211	37838	92565	39448	91891	41045	91188	46
15	34612	93819	36244	93201	37865	92554	39474	91879	41072	91176	45
16	34639	93809	36271	93190	37892	92543	39501	91868	41098	91164	44
17	34666	93799	36298	93180	37919	92532	39528	91856	41125	91152	43
18	34694	93789	36325	93169	37946	92521	39555	91845	41151	91140	42
19	34721	93779	36352	93159	37973	92510	39581	91833	41178	91128	41
20	34748	93769	36379	93148	37999	92499	39608	91822	41204	91116	40
21	34775	93759	36406	93137	38026	92488	39635	91810	41231	91104	39
22	34803	93748	36434	93127	38053	92477	39661	91799	41257	91092	38
23	34830	93738	36461	93116	38080	92466	39688	91787	41284	91080	37
24	34857	93728	36488	93106	38107	92455	39715	91775	41310	91068	36
25	34884	93718	36515	93095	38134	92444	39741	91764	41337	91056	35
26	34912	93708	36542	93084	38161	92432	39768	91752	41363	91044	34
27	34939	93698	36569	93074	38188	92421	39795	91741	41390	91032	33
28	34966	93688	36596	93063	38215	92410	39822	91729	41416	91020	32
29	34993	93677	36623	93052	38241	92399	39848	91718	41443	91008	31
30	35021	93667	36650	93042	38268	92388	39875	91706	41469	90996	30
31	35048	93657	36677	93031	38295	92377	39902	91694	41496	90984	29
32	35075	93647	36704	93020	38322	92366	39928	91683	41522	90972	28
33	35102	93637	36731	93010	38349	92355	39955	91671	41549	90960	27
34	35130	93626	36758	92999	38376	92343	39982	91660	41575	90948	26
35	35157	93616	36785	92988	38403	92332	40008	91648	41602	90936	25
36	35184	93606	36812	92978	38430	92321	40035	91636	41628	90924	24
37	35211	93596	36839	92967	38456	92310	40062	91625	41655	90911	23
38	35239	93585	36867	92956	38483	92299	40088	91613	41681	90899	22
39	35266	93575	36894	92945	38510	92287	40115	91601	41707	90887	21
40	35293	93565	36921	92935	38537	92276	40141	91590	41734	90875	20
41	35320	93555	36948	92924	38564	92265	40168	91578	41760	90863	19
42	35347	93544	36975	92913	38591	92254	40195	91566	41787	90851	18
43	35375	93534	37002	92902	38617	92243	40221	91555	41813	90839	17
44	35402	93524	37029	92892	38644	92231	40248	91543	41840	90826	16
45	35429	93514	37056	92881	38671	92220	40275	91531	41866	90814	15
46	35456	93503	37083	92870	38698	92209	40301	91519	41892	90802	14
47	35484	93493	37110	92859	38725	92198	40328	91508	41919	90790	13
48	35511	93483	37137	92849	38752	92186	40355	91496	41945	90778	12
49	35538	93472	37164	92838	38778	92175	40381	91484	41972	90766	11
50	35565	93462	37191	92827	38805	92164	40408	91472	41998	90753	10
51	35592	93452	37218	92816	38832	92152	40434	91461	42024	90741	9
52	35619	93441	37245	92805	38859	92141	40461	91449	42051	90729	8
53	35647	93431	37272	92794	38886	92130	40488	91437	42077	90717	7
54	35674	93420	37299	92784	38912	92119	40514	91425	42104	90704	6
55	35701	93410	37326	92773	38939	92107	40541	91414	42130	90692	5
56	35728	93400	37353	92762	38966	92096	40567	91402	42156	90680	4
57	35755	93389	37380	92751	38993	92085	40594	91390	42183	90668	3
58	35782	93379	37407	92740	39020	92073	40621	91378	42209	90655	2
59	35810	93368	37434	92729	39046	92062	40647	91366	42235	90643	1
60	35837	93358	37461	92718	39073	92050	40674	91355	42262	90631	0
′	N. cos.	N. sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N.sine.	′
	69°		68°		67°		66°		65°		

′	25°		26°		27°		28°		29°		′
	N.sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine	N. cos.	
0	42262	90631	43837	89879	45399	89101	46947	88295	48481	87462	60
1	42288	90618	43863	89867	45425	89087	46973	88281	48506	87448	59
2	42315	90606	43889	89854	45451	89074	46999	88267	48532	87434	58
3	42341	90594	43916	89841	45477	89061	47024	88254	48557	87420	57
4	42367	90582	43942	89828	45503	89048	47050	88240	48583	87406	56
5	42394	90569	43968	89816	45529	89035	47076	88226	48608	87391	55
6	42420	90557	43994	89803	45554	89021	47101	88213	48634	87377	54
7	42446	90545	44020	89790	45580	89008	47127	88199	48659	87363	53
8	42473	90532	44046	89777	45606	88995	47153	88185	48684	87349	52
9	42499	90520	44072	89764	45632	88981	47178	88172	48710	87335	51
10	42525	90507	44098	89752	45658	88968	47204	88158	48735	87321	50
11	42552	90495	44124	89739	45684	88955	47229	88144	48761	87306	49
12	42578	90483	44151	89726	45710	88942	47255	88130	48786	87292	48
13	42604	90470	44177	89713	45736	88928	47281	88117	48811	87278	47
14	42631	90458	44203	89700	45762	88915	47306	88103	48837	87264	46
15	42657	90446	44229	89687	45787	88902	47332	88089	48862	87250	45
16	42683	90433	44255	89674	45813	88888	47358	88075	48888	87235	44
17	42709	90421	44281	89662	45839	88875	47383	88062	48913	87221	43
18	42736	90408	44307	89649	45865	88862	47409	88048	48938	87207	42
19	42762	90396	44333	89636	45891	88848	47434	88034	48964	87193	41
20	42788	90383	44359	89623	45917	88835	47460	88020	48989	87178	40
21	42815	90371	44385	89610	45942	88822	47486	88006	49014	87164	39
22	42841	90358	44411	89597	45968	88808	47511	87993	49040	87150	38
23	42867	90346	44437	89584	45994	88795	47537	87979	49065	87136	37
24	42894	90334	44464	89571	46020	88782	47562	87965	49090	87121	36
25	42920	90321	44490	89558	46046	88768	47588	87951	49116	87107	35
26	42946	90309	44516	89545	46072	88755	47614	87937	49141	87093	34
27	42972	90296	44542	89532	46097	88741	47639	87923	49166	87079	33
28	42999	90284	44568	89519	46123	88728	47665	87909	49192	87064	32
29	43025	90271	44594	89506	46149	88715	47690	87896	49217	87050	31
30	43051	90259	44620	89493	46175	88701	47716	87882	49242	87036	30
31	43077	90246	44646	89480	46201	88688	47741	87868	49268	87021	29
32	43104	90233	44672	89467	46226	88674	47767	87854	49293	87007	28
33	43130	90221	44698	89454	46252	88661	47793	87840	49318	86993	27
34	43156	90208	44724	89441	46278	88647	47818	87826	49344	86978	26
35	43182	90196	44750	89428	46304	88634	47844	87812	49369	86964	25
36	43209	90183	44776	89415	46330	88620	47869	87798	49394	86949	24
37	43235	90171	44802	89402	46355	88607	47895	87784	49419	86935	23
38	43261	90158	44828	89389	46381	88593	47920	87770	49445	86921	22
39	43287	90146	44854	89376	46407	88580	47946	87756	49470	86906	21
40	43313	90133	44880	89363	46433	88566	47971	87743	49495	86892	20
41	43340	90120	44906	89350	46458	88553	47997	87729	49521	86878	19
42	43366	90108	44932	89337	46484	88539	48022	87715	49546	86863	18
43	43392	90095	44958	89324	46510	88526	48048	87701	49571	86849	17
44	43418	90082	44984	89311	46536	88512	48073	87687	49596	86834	16
45	43445	90070	45010	89298	46561	88499	48099	87673	49622	86820	15
46	43471	90057	45036	89285	46587	88485	48124	87659	49647	86805	14
47	43497	90045	45062	89272	46613	88472	48150	87645	49672	86791	13
48	43523	90032	45088	89259	46639	88458	48175	87631	49697	86777	12
49	43549	90019	45114	89245	46664	88445	48201	87617	49723	86762	11
50	43575	90007	45140	89232	46690	88431	48226	87603	49748	86748	10
51	43602	89994	45166	89219	46716	88417	48252	87589	49773	86733	9
52	43628	89981	45192	89206	46742	88404	48277	87575	49798	86719	8
53	43654	89968	45218	89193	46767	88390	48303	87561	49824	86704	7
54	43680	89956	45243	89180	46793	88377	48328	87546	49849	86690	6
55	43706	89943	45269	89167	46819	88363	48354	87532	49874	86675	5
56	43733	89930	45295	89153	46844	88349	48379	87518	49899	86661	4
57	43759	89918	45321	89140	46870	88336	48405	87504	49924	86646	3
58	43785	89905	45347	89127	46896	88322	48430	87490	49950	86632	2
59	43811	89892	45373	89114	46921	88308	48456	87476	49975	86617	1
60	43837	89879	45399	89101	46947	88295	48481	87462	50000	86603	0
′	N cos.	N. sine.	N. cos	N. sine.	N. cos.	N. sine.	N. cos.	N. sine	N. cos.	N sine	′
	64°		63°		62°		61°		60°		

′	30°		31°		32°		33°		34°		′
	N.sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	
0	50000	86603	51504	85717	52992	84805	54464	83867	55919	82904	60
1	50025	86588	51529	85702	53017	84789	54488	83851	55943	82887	59
2	50050	86573	51554	85687	53041	84774	54513	83835	55968	82871	58
3	50076	86559	51579	85672	53066	84759	54537	83819	55992	82855	57
4	50101	86544	51604	85657	53091	84743	54561	83804	56016	82839	56
5	50126	86530	51628	85642	53115	84728	54586	83788	56040	82822	55
6	50151	86515	51653	85627	53140	84712	54610	83772	56064	82806	54
7	50176	86501	51678	85612	53164	84697	54635	83756	56088	82790	53
8	50201	86486	51703	85597	53189	84681	54659	83740	56112	82773	52
9	50227	86471	51728	85582	53214	84666	54683	83724	56136	82757	51
10	50252	86457	51753	85567	53238	84650	54708	83708	56160	82741	50
11	50277	86442	51778	85551	53263	84635	54732	83692	56184	82724	49
12	50302	86427	51803	85536	53288	84619	54756	83676	56208	82708	48
13	50327	86413	51828	85521	53312	84604	54781	83660	56232	82692	47
14	50352	86398	51852	85506	53337	84588	54805	83645	56256	82675	46
15	50377	86384	51877	85491	53361	84573	54829	83629	56280	82659	45
16	50403	86369	51902	85476	53386	84557	54854	83613	56305	82643	44
17	50428	86354	51927	85461	53411	84542	54878	83597	56329	82626	43
18	50453	86340	51952	85446	53435	84526	54902	83581	56353	82610	42
19	50478	86325	51977	85431	53460	84511	54927	83565	56377	82593	41
20	50503	86310	52002	85416	53484	84495	54951	83549	56401	82577	40
21	50528	86295	52026	85401	53509	84480	54975	83533	56425	82561	39
22	50553	86281	52051	85385	53534	84464	54999	83517	56449	82544	38
23	50578	86266	52076	85370	53558	84448	55024	83501	56473	82528	37
24	50603	86251	52101	85355	53583	84433	55048	83485	56497	82511	36
25	50628	86237	52126	85340	53607	84417	55072	83469	56521	82495	35
26	50654	86222	52151	85325	53632	84402	55097	83453	56545	82478	34
27	50679	86207	52175	85310	53656	84386	55121	83437	56569	82462	33
28	50704	86192	52200	85294	53681	84370	55145	83421	56593	82446	32
29	50729	86178	52225	85279	53705	84355	55169	83405	56617	82429	31
30	50754	86163	52250	85264	53730	84339	55194	83389	56641	82413	30
31	50779	86148	52275	85249	53754	84324	55218	83373	56665	82396	29
32	50804	86133	52299	85234	53779	84308	55242	83356	56689	82380	28
33	50829	86119	52324	85218	53804	84292	55266	83340	56713	82363	27
34	50854	86104	52349	85203	53828	84277	55291	83324	56736	82347	26
35	50879	86089	52374	85188	53853	84261	55315	83308	56760	82330	25
36	50904	86074	52399	85173	53877	84245	55339	83292	56784	82314	24
37	50929	86059	52423	85157	53902	84230	55363	83276	56808	82297	23
38	50954	86045	52448	85142	53926	84214	55388	83260	56832	82281	22
39	50979	86030	52473	85127	53951	84198	55412	83244	56856	82264	21
40	51004	86015	52498	85112	53975	84182	55436	83228	56880	82248	20
41	51029	86000	52522	85096	54000	84167	55460	83212	56904	82231	19
42	51054	85985	52547	85081	54024	84151	55484	83195	56928	82214	18
43	51079	85970	52572	85066	54049	84135	55509	83179	56952	82198	17
44	51104	85956	52597	85051	54073	84120	55533	83163	56976	82181	16
45	51129	85941	52621	85035	54097	84104	55557	83147	57000	82165	15
46	51154	85926	52646	85020	54122	84088	55581	83131	57024	82148	14
47	51179	85911	52671	85005	54146	84072	55605	83115	57047	82132	13
48	51204	85896	52696	84989	54171	84057	55630	83098	57071	82115	12
49	51229	85881	52720	84974	54195	84041	55654	83082	57095	82098	11
50	51254	85866	52745	84959	54220	84025	55678	83066	57119	82082	10
51	51279	85851	52770	84943	54244	84009	55702	83050	57143	82065	9
52	51304	85836	52794	84928	54269	83994	55726	83034	57167	82048	8
53	51329	85821	52819	84913	54293	83978	55750	83017	57191	82032	7
54	51354	85806	52844	84897	54317	83962	55775	83001	57215	82015	6
55	51379	85792	52869	84882	54342	83946	55799	82985	57238	81999	5
56	51404	85777	52893	84866	54366	83930	55823	82969	57262	81982	4
57	51429	85762	52918	84851	54391	83915	55847	82953	57286	81965	3
58	51454	85747	52943	84836	54415	83899	55871	82936	57310	81949	2
59	51479	85732	52967	84820	54440	83883	55895	82920	57334	81932	1
60	51504	85717	52992	84805	54464	83867	55919	82904	57358	81915	0
′	N.cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine	′
	59°		58°		57°		56°		55°		

′	35° N.sine	35° N. cos.	36° N. sine.	36° N. cos.	37° N. sine.	37° N. cos.	38° N. sine.	38° N. cos.	39° N. sine	39° N. cos.	′
0	57358	81915	58779	80902	60181	79864	61566	78801	62932	77715	60
1	57381	81899	58802	80885	60205	79846	61589	78783	62955	77696	59
2	57405	81882	58826	80867	60228	79829	61612	78765	62977	77678	58
3	57429	81865	58849	80850	60251	79811	61635	78747	63000	77660	57
4	57453	81848	58873	80833	60274	79793	61658	78729	63022	77641	56
5	57477	81832	58896	80816	60298	79776	61681	78711	63045	77623	55
6	57501	81815	58920	80799	60321	79758	61704	78693	63068	77605	54
7	57524	81798	58943	80782	60344	79741	61726	78676	63090	77586	53
8	57548	81781	58967	80765	60367	79723	61749	78658	63113	77568	52
9	57572	81765	58990	80748	60390	79706	61772	78640	63135	77550	51
10	57596	81748	59014	80730	60414	79688	61795	78622	63158	77531	50
11	57619	81731	59037	80713	60437	79671	61818	78604	63180	77513	49
12	57643	81714	59061	80696	60460	79653	61841	78586	63203	77494	48
13	57667	81698	59084	80679	60483	79635	61864	78568	63225	77476	47
14	57691	81681	59107	80662	60506	79618	61887	78550	63248	77458	46
15	57715	81664	59131	80644	60529	79600	61909	78532	63271	77439	45
16	57738	81647	59154	80627	60553	79583	61932	78514	63293	77421	44
17	57762	81631	59178	80610	60576	79565	61955	78496	63316	77402	43
18	57786	81614	59201	80593	60599	79547	61978	78478	63338	77384	42
19	57809	81597	59225	80576	60622	79530	62001	78460	63361	77366	41
20	57833	81580	59248	80558	60645	79512	62024	78442	63383	77347	40
21	57857	81563	59272	80541	60668	79494	62046	78424	63406	77329	39
22	57881	81546	59295	80524	60691	79477	62069	78405	63428	77310	38
23	57904	81530	59318	80507	60714	79459	62092	78387	63451	77292	37
24	57928	81513	59342	80489	60738	79441	62115	78369	63473	77273	36
25	57952	81496	59365	80472	60761	79424	62138	78351	63496	77255	35
26	57976	81479	59389	80455	60784	79406	62160	78333	63518	77236	34
27	57999	81462	59412	80438	60807	79388	62183	78315	63540	77218	33
28	58023	81445	59435	80420	60830	79371	62206	78297	63563	77199	32
29	58047	81428	59459	80403	60853	79353	62229	78279	63585	77181	31
30	58070	81412	59482	80386	60876	79335	62251	78261	63608	77162	30
31	58094	81395	59506	80368	60899	79318	62274	78243	63630	77144	29
32	58118	81378	59529	80351	60922	79300	62297	78225	63653	77125	28
33	58141	81361	59552	80334	60945	79282	62320	78206	63675	77107	27
34	58165	81344	59576	80316	60968	79264	62342	78188	63698	77088	26
35	58189	81327	59599	80299	60991	79247	62365	78170	63720	77070	25
36	58212	81310	59622	80282	61015	79229	62388	78152	63742	77051	24
37	58236	81293	59646	80264	61038	79211	62411	78134	63765	77033	23
38	58260	81276	59669	80247	61061	79193	62433	78116	63787	77014	22
39	58283	81259	59693	80230	61084	79176	62456	78098	63810	76996	21
40	58307	81242	59716	80212	61107	79158	62479	78079	63832	76977	20
41	58330	81225	59739	80195	61130	79140	62502	78061	63854	76959	19
42	58354	81208	59763	80178	61153	79122	62524	78043	63877	76940	18
43	58378	81191	59786	80160	61176	79105	62547	78025	63899	76921	17
44	58401	81174	59809	80143	61199	79087	62570	78007	63922	76903	16
45	58425	81157	59832	80125	61222	79069	62592	77988	63944	76884	15
46	58449	81140	59856	80108	61245	79051	62615	77970	63966	76866	14
47	58472	81123	59879	80091	61268	79033	62638	77952	63989	76847	13
48	58496	81106	59902	80073	61291	79015	62660	77934	64011	76828	12
49	58519	81089	59926	80056	61314	78998	62683	77916	64033	76810	11
50	58543	81072	59949	80038	61337	78980	62706	77897	64056	76791	10
51	58567	81055	59972	80021	61360	78962	62728	77879	64078	76772	9
52	58590	81038	59995	80003	61383	78944	62751	77861	64100	76754	8
53	58614	81021	60019	79986	61406	78926	62774	77843	64123	76735	7
54	58637	81004	60042	79968	61429	78908	62796	77824	64145	76717	6
55	58661	80987	60065	79951	61451	78891	62819	77806	64167	76698	5
56	58684	80970	60089	79934	61474	78873	62842	77788	64190	76679	4
57	58708	80953	60112	79916	61497	78855	62864	77769	64212	76661	3
58	58731	80936	60135	79899	61520	78837	62887	77751	64234	76642	2
59	58755	80919	60158	79881	61543	78819	62909	77733	64256	76623	1
60	58779	80902	60181	79864	61566	78801	62932	77715	64279	76604	0
′	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N.sine	′
	54°		53°		52°		51°		50°		

′	40°		41°		42°		43°		44°		′
	N.sine	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	
0	64279	76604	65606	75471	66913	74314	68200	73135	69466	71934	60
1	64301	76586	65628	75452	66935	74295	68221	73116	69487	71914	59
2	64323	76567	65650	75433	66956	74276	68242	73096	69508	71894	58
3	64346	76548	65672	75414	66978	74256	68264	73076	69529	71873	57
4	64368	76530	65694	75395	66999	74237	63285	73056	69549	71853	56
5	64390	76511	65716	75375	67021	74217	68306	73036	69570	71833	55
6	64412	76492	65738	75356	67043	74198	68327	73016	69591	71813	54
7	64435	76473	65759	75337	67064	74178	68349	72996	69612	71792	53
8	64457	76455	65781	75318	67086	74159	68370	72976	69633	71772	52
9	64479	76436	65803	75299	67107	74139	68391	72957	69654	71752	51
10	64501	76417	65825	75280	67129	74120	68412	72937	69675	71732	50
11	64524	76398	65847	75261	67151	74100	68433	72917	69696	71711	49
12	64546	76380	65869	75241	67172	74080	68455	72897	69717	71691	48
13	64568	76361	65891	75222	67194	74061	68476	72877	69737	71671	47
14	64590	76342	65913	75203	67215	74041	68497	72857	69758	71650	46
15	64612	76323	65935	75184	67237	74022	68518	72837	69779	71630	45
16	64635	76304	65956	75165	67258	74002	68539	72817	69800	71610	44
17	64657	76286	65978	75146	67280	73983	68561	72797	69821	71590	43
18	64679	76267	66000	75126	67301	73963	68582	72777	69842	71569	42
19	64701	76248	66022	75107	67323	73944	68603	72757	69862	71549	41
20	64723	76229	66044	75088	67344	73924	68624	72737	69883	71529	40
21	64746	76210	66066	75069	67366	73904	68645	72717	69904	71508	39
22	64768	76192	66088	75050	67387	73885	68666	72697	69925	71488	38
23	64790	76173	66109	75030	67409	73865	68688	72677	69946	71468	37
24	64812	76154	66131	75011	67430	73846	68709	72657	69966	71447	36
25	64834	76135	66153	74992	67452	73826	68730	72637	69987	71427	35
26	64856	76116	66175	74973	67473	73806	68751	72617	70008	71407	34
27	64878	76097	66197	74953	67495	73787	68772	72597	70029	71386	33
28	64901	76078	66218	74934	67516	73767	68793	72577	70049	71366	32
29	64923	76059	66240	74915	67538	73747	68814	72557	70070	71345	31
30	64945	76041	66262	74896	67559	73728	68835	72537	70091	71325	30
31	64967	76022	66284	74876	67580	73708	68857	72517	70112	71305	29
32	64989	76003	66306	74857	67602	73688	68878	72497	70132	71284	28
33	65011	75984	66327	74838	67623	73669	68899	72477	70153	71264	27
34	65033	75965	66349	74818	67645	73649	68920	72457	70174	71243	26
35	65055	75946	66371	74799	67666	73629	68941	72437	70195	71223	25
36	65077	75927	66393	74780	67688	73610	68962	72417	70215	71203	24
37	65099	75908	66414	74760	67709	73590	68983	72397	70236	71182	23
38	65122	75889	66436	74741	67730	73570	69004	72377	70257	71162	22
39	65144	75870	66458	74722	67752	73551	69025	72357	70277	71141	21
40	65166	75851	66480	74703	67773	73531	69046	72337	70298	71121	20
41	65188	75832	66501	74683	67795	73511	69067	72317	70319	71100	19
42	65210	75813	66523	74664	67816	73491	69088	72297	70339	71080	18
43	65232	75794	66545	74644	67837	73472	69109	72277	70360	71059	17
44	65254	75775	66566	74625	67859	73452	69130	72257	70381	71039	16
45	65276	75756	66588	74606	67880	73432	69151	72236	70401	71019	15
46	65298	75738	66610	74586	67901	73412	69172	72216	70422	70998	14
47	65320	75719	66632	74567	67923	73393	69193	72196	70443	70978	13
48	65342	75699	66653	74548	67944	73373	69214	72176	70463	70957	12
49	65364	75680	66675	74528	67965	73353	69235	72156	70484	70937	11
50	65386	75661	66697	74509	67987	73333	69256	72136	70505	70916	10
51	65408	75642	66718	74489	68008	73314	69277	72116	70525	70896	9
52	65430	75623	66740	74470	68029	73294	69298	72095	70546	70875	8
53	65452	75604	66762	74451	68051	73274	69319	72075	70567	70855	7
54	65474	75585	66783	74431	68072	73254	69340	72055	70587	70834	6
55	65496	75566	66805	74412	68093	73234	69361	72035	70608	70813	5
56	65518	75547	66827	74392	68115	73215	69382	72015	70628	70793	4
57	65540	75528	66848	74373	68136	73195	69403	71995	70649	70772	3
58	65562	75509	66870	74353	68157	73175	69424	71974	70670	70752	2
59	65584	75490	66891	74334	68179	73155	69445	71954	70690	70731	1
60	65606	75471	66913	74314	68200	73135	69466	71934	70711	70711	0
′	N.cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine.	N. cos.	N. sine	N. cos.	N.sine	′
	49°		48°		47°		46°		45°		

TABLE XI.

LOGARITHMS OF NUMBERS.

No.	0	1	2	3	4	5	6	7	8	9
100	00 000	043	087	130	173	217	260	303	346	389
101	432	475	518	561	604	647	689	732	775	817
102	860	903	945	988						
	01 —	—	—	—	030	072	115	157	199	242
103	284	326	368	410	452	494	536	578	620	662
104	703	745	787	828	870	912	953	995		
	02 —	—	—	—	—	—	—	—	036	078
105	119	160	202	243	284	325	366	407	449	490
106	531	572	612	653	694	735	776	816	857	898
107	938	979								
	03 —	—	019	060	100	141	181	222	262	302
108	342	383	423	463	503	543	583	623	663	703
109	743	782	822	862	902	941	981			
	04 —	—	—	—	—	—	—	021	060	100
110	139	179	218	258	297	336	376	415	454	493
111	532	571	610	650	689	727	766	805	844	883
112	922	961	999							
	05 —	—	—	038	077	115	154	192	231	269
113	308	346	385	423	461	500	538	576	614	652
114	690	729	767	805	843	881	918	956	994	
	06 —	—	—	—	—	—	—	—	—	032
115	070	108	145	183	221	258	296	333	371	408
116	446	483	521	558	595	633	670	707	744	781
117	819	856	893	930	967					
	07 —	—	—	—	—	004	041	078	115	151
118	188	225	262	298	335	372	408	445	482	518
119	555	591	628	664	700	737	773	809	846	882
120	918	954	990							
	08 —	—	—	027	063	099	135	171	207	243
121	279	314	350	386	422	458	493	529	565	600
122	636	672	707	743	778	814	849	884	920	955
123	991									
	09 —	026	061	096	132	167	202	237	272	307
124	342	377	412	447	482	517	552	587	621	656
125	691	726	760	795	830	864	899	934	968	
	10 —	—	—	—	—	—	—	—	—	003
126	037	072	106	140	175	209	243	278	312	346
127	380	415	449	483	517	551	585	619	653	687
128	721	755	789	823	857	890	924	958	992	
	11 —	—	—	—	—	—	—	—	—	025
129	059	093	126	160	193	227	261	294	327	361
130	394	428	461	494	528	561	594	628	661	694
131	727	760	793	826	860	893	926	959	992	
	12 —	—	—	—	—	—	—	—	—	024
132	057	090	123	156	189	222	254	287	320	352
133	385	418	450	483	516	548	581	613	646	678
134	710	743	775	808	840	872	905	937	969	
	13 —	—	—	—	—	—	—	—	—	001
135	033	066	098	130	162	194	226	258	290	322
136	354	386	418	450	481	513	545	577	609	640
137	672	704	735	767	799	830	862	893	925	956
138	988									
	14 —	019	051	082	114	145	176	208	239	270
139	301	333	364	395	426	457	489	520	551	582
140	613	644	675	706	737	768	799	829	860	891
141	922	953	983							
	15 —	—	—	014	045	076	106	137	168	198
142	229	259	290	320	351	381	412	442	473	503
143	534	564	594	625	655	685	715	746	776	806
144	836	866	897	927	957	987				
	16 —	—	—	—	—	—	017	047	077	107
145	137	167	197	227	256	286	316	346	376	406
146	435	465	495	524	554	584	613	643	673	702
147	732	761	791	820	850	879	909	938	967	997
148	17 026	056	085	114	143	173	202	231	260	289
149	319	348	377	406	435	464	493	522	551	580

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Diff.

No.	0	1	2	3	4	5	6	7	8	9
150	17 609	638	667	696	725	754	782	811	840	869
151	898	926	955	984						
	18 –	–	–	–	013	041	070	099	127	156
152	184	213	241	270	298	327	355	384	412	441
153	469	498	526	554	583	611	639	667	696	724
154	752	780	808	837	865	893	921	949	977	
	19 –	–	–	–	–	–	–	–	–	005
155	033	061	089	117	145	173	201	229	257	285
156	312	340	368	396	424	451	479	507	535	562
157	590	618	645	673	700	728	756	783	811	838
158	866	893	921	948	976					
	20 –	–	–	–	–	003	030	058	085	112
159	140	167	194	222	249	276	303	330	358	385
160	412	439	466	493	520	548	575	602	629	656
161	683	710	737	763	790	817	844	871	898	925
162	952	978								
	21 –	–	005	032	059	085	112	139	165	192
163	219	245	272	299	325	352	378	405	431	458
164	484	511	537	564	590	617	643	669	696	722
165	748	775	801	827	854	880	906	932	958	985
166	22 011	037	063	089	115	141	167	194	220	246
167	272	298	324	350	376	401	427	453	479	505
168	531	557	583	608	634	660	686	712	737	763
169	789	814	840	866	891	917	943	968	994	
	23 –	–	–	–	–	–	–	–	–	019
170	045	070	096	121	147	172	198	223	249	274
171	300	325	350	376	401	427	452	477	502	528
172	553	578	603	629	654	679	704	729	754	779
173	805	830	855	880	905	930	955	980		
	24 –	–	–	–	–	–	–	–	005	030
174	055	080	105	130	155	180	204	229	254	279
175	304	329	353	378	403	428	452	477	502	527
176	551	576	601	625	650	674	699	724	748	773
177	797	822	846	871	895	920	944	969	993	
	25 –	–	–	–	–	–	–	–	–	018
178	042	066	091	115	139	164	188	212	237	261
179	285	310	334	358	382	406	431	455	479	503
180	527	551	575	600	624	648	672	696	720	744
181	768	792	816	840	864	888	912	935	959	983
182	26 007	031	055	079	102	126	150	174	198	221
183	245	269	293	316	340	364	387	411	435	458
184	482	505	529	553	576	600	623	647	670	694
185	717	741	764	788	811	834	858	881	905	928
186	951	975	998							
	27 –	–	–		021	045	068	091	114	138	161
187	184	207	231	254	277	300	323	346	370	393
188	416	439	462	485	508	531	554	577	600	623
189	646	669	692	715	738	761	784	807	830	852
190	875	898	921	944	967	989				
	28 –	–	–	–	–	–	012	035	058	081
191	103	126	149	171	194	217	240	262	285	307
192	330	353	375	398	421	443	466	488	511	533
193	556	578	601	623	646	668	691	713	735	758
194	780	803	825	847	870	892	914	937	959	981
195	29 003	026	048	070	092	115	137	159	181	203
196	226	248	270	292	314	336	358	380	403	425
197	447	469	491	513	535	557	579	601	623	645
198	667	688	710	732	754	776	798	820	842	863
199	885	907	929	951	973	994				
	30 –	–	–	–	–	–	016	038	060	031
No.	0	1	2	3	4	5	6	7	8	9

Diff.									
28		27		26		25		24	
1	3	1	3	1	3	1	3	1	2
2	6	2	5	2	5	2	5	2	5
3	8	3	8	3	8	3	8	3	7
4	11	4	11	4	10	4	10	4	10
5	14	5	14	5	13	5	13	5	12
6	17	6	16	6	16	6	15	6	14
7	20	7	19	7	18	7	18	7	17
8	22	8	22	8	21	8	20	8	19
9	25	9	24	9	23	9	23	9	22

Diff.									
23		22		21					
1	2	1	2	1	2				
2	5	2	4	2	4				
3	7	3	7	3	6				
4	9	4	9	4	8				
5	12	5	11	5	11				
6	14	6	13	6	13				
7	16	7	15	7	15				
8	18	8	18	8	17				
9	21	9	20	9	19				

No.	0	1	2	3	4	5	6	7	8	9	Diff.
200	30 103	125	146	168	190	211	233	255	276	298	22
201	320	341	363	384	406	428	449	471	492	514	1 2
											2 4
202	535	557	578	600	621	643	664	685	707	728	3 7
203	750	771	792	814	835	856	878	899	920	942	4 9
204	963	984									5 11
	31 —	—	006	027	048	069	091	112	133	154	6 13
205	175	197	218	239	260	281	302	323	345	366	7 15
206	387	408	429	450	471	492	513	534	555	576	8 18
207	597	618	639	660	681	702	723	744	765	785	9 20
208	806	827	848	869	890	911	931	952	973	994	
											21
209	32 015	035	056	077	098	118	139	160	181	201	1 2
210	222	243	263	284	305	325	346	366	387	408	2 4
211	428	449	469	490	510	531	552	572	593	613	3 6
212	634	654	675	695	715	736	756	777	797	818	4 8
213	838	858	879	899	919	940	960	980			5 11
	33 —	—	—	—	—	—	—	—	001	021	6 13
214	041	062	082	102	122	143	163	183	203	224	7 15
215	244	264	284	304	325	345	365	385	405	425	8 17
											9 19
216	445	465	486	506	526	546	566	586	606	626	
217	646	666	686	706	726	746	766	786	806	826	20
218	846	866	885	905	925	945	965	985			1 2
	34 —	—	—	—	—	—	—	—	005	025	2 4
219	044	064	084	104	124	143	163	183	203	223	3 6
220	242	262	282	301	321	341	361	380	400	420	4 8
											5 10
221	439	459	479	498	518	537	557	577	596	616	6 12
222	635	655	674	694	713	733	753	772	792	811	7 14
223	830	850	869	889	908	928	947	967	986		8 16
	35 —	—	—	—	—	—	—	—	—	005	9 18
224	025	044	064	083	102	122	141	160	180	199	
225	218	238	257	276	295	315	334	353	372	392	19
226	411	430	449	468	488	507	526	545	564	583	1 2
											2 4
227	603	622	641	660	679	698	717	736	755	774	3 6
228	793	813	832	851	870	889	908	927	946	965	4 8
229	984										5 10
	36 —	003	021	040	059	078	097	116	135	154	6 11
230	173	192	211	229	248	267	286	305	324	342	7 13
231	361	380	399	418	436	455	474	493	511	530	8 15
											9 17
232	549	568	586	605	624	642	661	680	698	717	
233	736	754	773	791	810	829	847	866	884	903	18
234	922	940	959	977	996						1 2
	37 —	—	—	—	—	014	033	051	070	088	2 4
235	107	125	144	162	181	199	218	236	254	273	3 5
236	291	310	328	346	365	383	401	420	438	457	4 7
											5 9
237	475	493	511	530	548	566	585	603	621	639	6 11
238	658	676	694	712	731	749	767	785	803	822	7 13
239	840	858	876	894	912	931	949	967	985		8 14
	38 —	—	—	—	—	—	—	—	—	003	9 16
240	021	039	057	075	093	112	130	148	166	184	
241	202	220	238	256	274	292	310	328	346	364	17
242	382	399	417	435	453	471	489	507	525	543	1 2
											2 3
243	561	578	596	614	632	650	668	686	703	721	3 5
244	739	757	775	792	810	828	846	863	881	899	4 7
245	917	934	952	970	987						5 9
	39 —	—	—	—	—	005	023	041	058	076	6 10
246	094	111	129	146	164	182	199	217	235	252	7 12
247	270	287	305	322	340	358	375	393	410	428	8 14
248	445	463	480	498	515	533	550	568	585	602	9 15
249	620	637	655	672	690	707	724	742	759	777	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
250	39 794	811	829	846	863	881	898	915	933	950	16
251	967	985									1 2
	40 –	–	002	019	037	054	071	088	106	123	2 3
252	140	157	175	192	209	226	243	261	278	295	3 5
253	312	329	346	364	381	398	415	432	449	466	4 6
											5 8
254	483	500	518	535	552	569	586	603	620	637	6 10
255	654	671	688	705	722	739	756	773	790	807	7 11
256	824	841	858	875	892	909	926	943	960	976	8 13
257	993										9 14
	41 –	010	027	044	061	078	095	111	128	145	
258	162	179	196	212	229	246	263	280	296	313	
259	330	347	363	380	397	414	430	447	464	481	
											15
260	497	514	531	547	564	581	597	614	631	647	1 2
261	664	681	697	714	731	747	764	780	797	814	2 3
262	830	847	863	880	896	913	929	946	963	979	3 5
263	996										4 6
	42 –	012	029	045	062	078	095	111	127	144	5 8
264	160	177	193	210	226	243	259	275	292	308	6 9
265	325	341	357	374	390	406	423	439	455	472	7 11
											8 12
266	488	504	521	537	553	570	586	602	619	635	9 14
267	651	667	684	700	716	732	749	765	781	797	
268	813	830	846	862	878	894	911	927	943	959	
269	975	991									
	43 –	–	008	024	040	056	072	088	104	120	
270	136	152	169	185	201	217	233	249	265	281	14
271	297	313	329	345	361	377	393	409	425	441	1 1
											2 3
272	457	473	489	505	521	537	553	569	584	600	3 4
273	616	632	648	664	680	696	712	727	743	759	4 6
274	775	791	807	823	838	854	870	886	902	917	5 7
275	933	949	965	981	996						6 8
	44 –	–	–	–	–	012	028	044	059	075	7 10
276	091	107	122	138	154	170	185	201	217	232	8 11
277	248	264	279	295	311	326	342	358	373	389	9 13
278	404	420	436	451	467	483	498	514	529	545	
279	560	576	592	607	623	638	654	669	685	700	
280	716	731	747	762	778	793	809	824	840	855	
281	871	886	902	917	932	948	963	979	994		
	45 –	–	–	–	–	–	–	–	–	010	
282	025	040	056	071	086	102	117	133	148	163	
283	179	194	209	225	240	255	271	286	301	317	
284	332	347	362	378	393	408	423	439	454	469	
285	484	500	515	530	545	561	576	591	606	621	
286	637	652	667	682	697	712	728	743	758	773	
287	788	803	818	834	849	864	879	894	909	924	
288	939	954	969	984							
	46 –	–	–	–	000	015	030	045	060	075	
289	090	105	120	135	150	165	180	195	210	225	
290	240	255	270	285	300	315	330	345	359	374	
291	389	404	419	434	449	464	479	494	509	523	
292	538	553	568	583	598	613	627	642	657	672	
293	687	702	716	731	746	761	776	790	805	820	
294	835	850	864	879	894	909	923	938	953	967	
295	982	997									
	47 –	–	012	026	041	056	070	085	100	114	
296	129	144	159	173	188	202	217	232	246	261	
297	276	290	305	319	334	349	363	378	392	407	
298	422	436	451	465	480	494	509	524	538	553	
299	567	582	596	611	625	640	654	669	683	698	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
300	47 712	727	741	756	770	784	799	813	828	842	15
301	857	871	885	900	914	929	943	958	972	986	1 2
											2 3
302	48 001	015	029	044	058	073	087	101	116	130	3 5
303	144	159	173	187	202	216	230	244	259	273	4 6
304	287	302	316	330	344	359	373	387	401	416	5 8
305	430	444	458	473	487	501	515	530	544	558	6 9
											7 11
306	572	586	601	615	629	643	657	671	686	700	8 12
307	714	728	742	756	770	785	799	813	827	841	9 14
308	855	869	883	897	911	926	940	954	968	982	
309	996										
	49 —	010	024	038	052	066	080	094	108	122	
310	136	150	164	178	192	206	220	234	248	262	
											14
311	276	290	304	318	332	346	360	374	388	402	1 1
312	415	429	443	457	471	485	499	513	527	541	2 3
											3 4
313	554	568	582	596	610	624	638	651	665	679	4 6
314	693	707	721	734	748	762	776	790	803	817	5 7
315	831	845	859	872	886	900	914	927	941	955	6 8
316	969	982	996								7 10
	50 —	—	—	010	024	037	051	065	079	092	8 11
317	106	120	133	147	161	174	188	202	215	229	9 13
318	243	256	270	284	297	311	325	338	352	365	
319	379	393	406	420	433	447	461	474	488	501	
											13
320	515	529	542	556	569	583	596	610	623	637	1 1
321	651	664	678	691	705	718	732	745	759	772	2 3
322	786	799	813	826	840	853	866	880	893	907	3 4
323	920	934	947	961	974	987					4 5
	51 —	—	—	—	—	—	001	014	028	041	5 7
324	055	068	081	095	108	121	135	148	162	175	6 8
325	188	202	215	228	242	255	268	282	295	308	7 9
326	322	335	348	362	375	388	402	415	428	441	8 10
											9 12
327	455	468	481	495	508	521	534	548	561	574	
328	587	601	614	627	640	654	667	680	693	706	
329	720	733	746	759	772	786	799	812	825	838	
											12
330	851	865	878	891	904	917	930	943	957	970	1 1
331	983	996									2 2
	52 —	—	009	022	035	048	061	075	088	101	3 4
332	114	127	140	153	166	179	192	205	218	231	4 5
333	244	257	270	284	297	310	323	336	349	362	5 6
334	375	388	401	414	427	440	453	466	479	492	6 7
											7 8
335	504	517	530	543	556	569	582	595	608	621	8 10
336	634	647	660	673	686	699	711	724	737	750	9 11
337	763	776	789	802	815	827	840	853	866	879	
338	892	905	917	930	943	956	969	982	994		
	53 —	—	—	—	—	—	—	—	—	007	
339	020	033	046	058	071	084	097	110	122	135	
340	148	161	173	186	199	212	224	237	250	263	
341	275	288	301	314	326	339	352	364	377	390	
342	403	415	428	441	453	466	479	491	504	517	
343	529	542	555	567	580	593	605	618	631	643	
344	656	668	681	694	706	719	732	744	757	769	
345	782	794	807	820	832	845	857	870	882	895	
346	908	920	933	945	958	970	983	995			
	54 —	—	—	—	—	—	—	—	008	020	
347	033	045	058	070	083	095	108	120	133	145	
348	158	170	183	195	208	220	233	245	258	270	
349	283	295	307	320	332	345	357	370	382	394	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
350	54 407	419	432	444	456	469	481	494	506	518	11
351	531	543	555	568	580	593	605	617	630	642	1 1
352	654	667	679	691	704	716	728	741	753	765	2 2
											3 3
353	777	790	802	814	827	839	851	864	876	888	4 4
354	900	913	925	937	949	962	974	986	998		5 6
	55 –	–	–	–	–	–	–	–	–	011	6 7
355	023	035	047	060	072	084	096	108	121	133	7 8
356	145	157	169	182	194	206	218	230	242	255	8 9
357	267	279	291	303	315	328	340	352	364	376	9 10
358	388	400	413	425	437	449	461	473	485	497	
359	509	522	534	546	558	570	582	594	606	618	
360	630	642	654	666	678	691	703	715	727	739	10
											1 1
361	751	763	775	787	799	811	823	835	847	859	2 2
362	871	883	895	907	919	931	943	955	967	979	3 3
363	991										4 4
	56 –	003	015	027	038	050	062	074	086	098	5 5
364	110	122	134	146	158	170	182	194	205	217	6 6
365	229	241	253	265	277	289	301	312	324	336	7 7
366	348	360	372	384	396	407	419	431	443	455	8 8
367	467	478	490	502	514	526	538	549	561	573	9 9
368	585	597	608	620	632	644	656	667	679	691	
369	703	714	726	738	750	761	773	785	797	808	
370	820	832	844	855	867	879	891	902	914	926	
371	937	949	961	972	984	996					
	57 –	–	–	–	–	–	008	019	031	043	
372	054	066	078	089	101	113	124	136	148	159	
373	171	183	194	206	217	229	241	252	264	276	
374	287	299	310	322	334	345	357	368	380	392	
375	403	415	426	438	449	461	473	484	496	507	
376	519	530	542	553	565	576	588	600	611	623	
377	634	646	657	669	680	692	703	715	726	738	
378	749	761	772	784	795	807	818	830	841	852	
379	864	875	887	898	910	921	933	944	955	967	
380	978	990									
	58 –	–	001	013	024	035	047	058	070	081	
381	092	104	115	127	138	149	161	172	184	195	
382	206	218	229	240	252	263	274	286	297	309	
383	320	331	343	354	365	377	388	399	410	422	
384	433	444	456	467	478	490	501	512	524	535	
385	546	557	569	580	591	602	614	625	636	647	
386	659	670	681	692	704	715	726	737	749	760	
387	771	782	794	805	816	827	838	850	861	872	
388	883	894	906	917	928	939	950	961	973	984	
389	995										
	59 –	006	017	028	040	051	062	073	084	095	
390	106	118	129	140	151	162	173	184	195	207	
391	218	229	240	251	262	273	284	295	306	318	
392	329	340	351	362	373	384	395	406	417	428	
393	439	450	461	472	483	494	506	517	528	539	
394	550	561	572	583	594	605	616	627	638	649	
395	660	671	682	693	704	715	726	737	748	759	
396	770	780	791	802	813	824	835	846	857	868	
397	879	890	901	912	923	934	945	956	966	977	
398	988	999									
	60 –	–	010	021	032	043	054	065	076	086	
399	097	108	119	130	141	152	163	173	184	195	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
400	60 206	217	228	239	249	260	271	282	293	304	11
401	314	325	336	347	358	369	379	390	401	412	1 | 1
402	423	433	444	455	466	477	487	498	509	520	2 | 2
											3 | 3
403	531	541	552	563	574	584	595	606	617	627	4 | 4
404	638	649	660	670	681	692	703	713	724	735	5 | 6
405	746	756	767	778	788	799	810	821	831	842	6 | 7
											7 | 8
406	853	863	874	885	895	906	917	927	938	949	8 | 9
407	959	970	981	991							9 | 10
	61 –	–	–	–	002	013	023	034	045	055	
408	066	077	087	098	109	119	130	140	151	162	
409	172	183	194	204	215	225	236	247	257	268	
410	278	289	300	310	321	331	342	352	363	374	
											10
411	384	395	405	416	426	437	448	458	469	479	1 | 1
412	490	500	511	521	532	542	553	563	574	584	2 | 2
413	595	606	616	627	637	648	658	669	679	690	3 | 3
											4 | 4
414	700	711	721	731	742	752	763	773	784	794	5 | 5
415	805	815	826	836	847	857	868	878	888	899	6 | 6
416	909	920	930	941	951	962	972	982	993		7 | 7
	62 –	–	–	–	–	–	–	–	–	003	8 | 8
417	014	024	034	045	055	066	076	086	097	107	9 | 9
418	118	128	138	149	159	170	180	190	201	211	
419	221	232	242	252	263	273	284	294	304	315	
420	325	335	346	356	366	377	387	397	408	418	9
421	428	439	449	459	469	480	490	500	511	521	1 | 1
422	531	542	552	562	572	583	593	603	613	624	2 | 2
											3 | 3
423	634	644	655	665	675	685	696	706	716	726	4 | 4
424	737	747	757	767	778	788	798	808	818	829	5 | 5
425	839	849	859	870	880	890	900	910	921	931	6 | 5
426	941	951	961	972	982	992					7 | 6
	63 –	–	–	–	–	–	002	012	022	033	8 | 7
427	043	053	063	073	083	094	104	114	124	134	9 | 8
428	144	155	165	175	185	195	205	215	225	236	
429	246	256	266	276	286	296	306	317	327	337	
430	347	357	367	377	387	397	407	417	428	438	
431	448	458	468	478	488	498	508	518	528	538	
432	548	558	568	579	589	599	609	619	629	639	
433	649	659	669	679	689	699	709	719	729	739	
434	749	759	769	779	789	799	809	819	829	839	
435	849	859	869	879	889	899	909	919	929	939	
436	949	959	969	979	988	998					
	64 –	–	–	–	–	–	008	018	028	038	
437	048	058	068	078	088	098	108	118	128	137	
438	147	157	167	177	187	197	207	217	227	237	
439	246	256	266	276	286	296	306	316	326	335	
440	345	355	365	375	385	395	404	414	424	434	
441	444	454	464	473	483	493	503	513	523	532	
442	542	552	562	572	582	591	601	611	621	631	
443	640	650	660	670	680	689	699	709	719	729	
444	738	748	758	768	777	787	797	807	816	826	
445	836	846	856	865	875	885	895	904	914	924	
446	933	943	953	963	972	982	992				
	65 –	–	–	–	–	–	–	002	011	021	
447	031	040	050	060	070	079	089	099	108	118	
448	128	137	147	157	167	176	186	196	205	215	
449	225	234	244	254	263	273	283	292	302	312	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
450	65 321	331	341	350	360	369	379	389	398	408	8
451	418	427	437	447	456	466	475	485	495	504	1 1
452	514	523	533	543	552	562	571	581	591	600	2 2
453	610	619	629	639	648	658	667	677	686	696	3 2
454	706	715	725	734	744	753	763	772	782	792	4 3
455	801	811	820	830	839	849	858	868	877	887	5 4
456	896	906	916	925	935	944	954	963	973	982	6 5
457	992										7 6
	66 –	001	011	020	030	039	049	058	068	077	8 6
458	087	096	106	115	124	134	143	153	162	172	9 7
459	181	191	200	210	219	229	238	247	257	266	
460	276	285	295	304	314	323	332	342	351	361	
461	370	380	389	398	408	417	427	436	445	455	
462	464	474	483	492	502	511	521	530	539	549	
463	558	567	577	586	596	605	614	624	633	642	
464	652	661	671	680	689	699	708	717	727	736	
465	745	755	764	773	783	792	801	811	820	829	
466	839	848	857	867	876	885	894	904	913	922	
467	932	941	950	960	969	978	987	997			
	67 –	–	–	–	–	–	–	–	006	015	
468	025	034	043	052	062	071	080	089	099	108	
469	117	127	136	145	154	164	173	182	191	201	
470	210	219	228	237	247	256	265	274	284	293	
471	302	311	321	330	339	348	357	367	376	385	
472	394	403	413	422	431	440	449	459	468	477	
473	486	495	504	514	523	532	541	550	560	569	
474	578	587	596	605	614	624	633	642	651	660	
475	669	679	688	697	706	715	724	733	742	752	
476	761	770	779	788	797	806	815	825	834	843	
477	852	861	870	879	888	897	906	916	925	934	
478	943	952	961	970	979	988	997				
	68 –	–	–	–	–	–	–	006	015	024	
479	034	043	052	061	070	079	088	097	106	115	
480	124	133	142	151	160	169	178	187	196	205	
481	215	224	233	242	251	260	269	278	287	296	
482	305	314	323	332	341	350	359	368	377	386	
483	395	404	413	422	431	440	449	458	467	476	
484	485	494	502	511	520	529	538	547	556	565	
485	574	583	592	601	610	619	628	637	646	655	
486	664	673	681	690	699	708	717	726	735	744	
487	753	762	771	780	789	797	806	815	824	833	
488	842	851	860	869	878	886	895	904	913	922	
489	931	940	949	958	966	975	984	993			
	69 –	–	–	–	–	–	–	–	002	011	
490	020	028	037	046	055	064	073	082	090	099	
491	108	117	126	135	144	152	161	170	179	188	
492	197	205	214	223	232	241	249	258	267	276	
493	285	294	302	311	320	329	338	346	355	364	
494	373	381	390	399	408	417	425	434	443	452	
495	461	469	478	487	496	504	513	522	531	539	
496	548	557	566	574	583	592	601	609	618	627	
497	636	644	653	662	671	679	688	697	705	714	
498	723	732	740	749	758	767	775	784	793	801	
499	810	819	827	836	845	854	862	871	880	888	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
500	69 897	906	914	923	932	940	949	958	966	975	9
501	984	992									1 1
	70 –	–	001	010	018	027	036	044	053	062	2 2
502	070	079	088	096	105	114	122	131	140	148	3 3
503	157	165	174	183	191	200	209	217	226	234	4 4
504	243	252	260	269	278	286	295	303	312	321	5 5
											6 5
505	329	338	346	355	364	372	381	389	398	406	7 6
506	415	424	432	441	449	458	467	475	484	492	8 7
507	501	509	518	526	535	544	552	561	569	578	9 8
508	586	595	603	612	621	629	638	646	655	663	
509	672	680	689	697	706	714	723	731	740	749	
510	757	766	774	783	791	800	808	817	825	834	8
511	842	851	859	868	876	885	893	902	910	919	1 1
512	927	935	944	952	961	969	978	986	995		2 2
	71 –	–	–	–	–	–	–	–	–	003	3 2
513	012	020	029	037	046	054	063	071	079	088	4 3
514	096	105	113	122	130	139	147	155	164	172	5 4
											6 5
515	181	189	198	206	214	223	231	240	248	257	7 6
516	265	273	282	290	299	307	315	324	332	341	8 6
											9 7
517	349	357	366	374	383	391	399	408	416	425	
518	433	441	450	458	466	475	483	492	500	508	
519	517	525	533	542	550	559	567	575	584	592	
											7
520	600	609	617	625	634	642	650	659	667	675	1 1
521	684	692	700	709	717	725	734	742	750	759	2 1
522	767	775	784	792	800	809	817	825	834	842	3 2
523	850	858	867	875	883	892	900	908	917	925	4 3
524	933	941	950	958	966	975	983	991	999		5 4
	72 –	–	–	–	–	–	–	–	–	008	6 4
525	016	024	032	041	049	057	066	074	082	090	7 5
526	099	107	115	123	132	140	148	156	165	173	8 6
527	181	189	198	206	214	222	230	239	247	255	9 6
528	263	272	280	288	296	304	313	321	329	337	
529	346	354	362	370	378	387	395	403	411	419	
530	428	436	444	452	460	469	477	485	493	501	
531	509	518	526	534	542	550	558	567	575	583	
532	591	599	607	616	624	632	640	648	656	665	
533	673	681	689	697	705	713	722	730	738	746	
534	754	762	770	779	787	795	803	811	819	827	
535	835	843	852	860	868	876	884	892	900	908	
536	916	925	933	941	949	957	965	973	981	989	
537	997										
	73 –	006	014	022	030	038	046	054	062	070	
538	078	086	094	102	111	119	127	135	143	151	
539	159	167	175	183	191	199	207	215	223	231	
540	239	247	255	263	272	280	288	296	304	312	
541	320	328	336	344	352	360	368	376	384	392	
542	400	408	416	424	432	440	448	456	464	472	
543	480	488	496	504	512	520	528	536	544	552	
544	560	568	576	584	592	600	608	616	624	632	
545	640	648	656	664	672	679	687	695	703	711	
546	719	727	735	743	751	759	767	775	783	791	
547	799	807	815	823	830	838	846	854	862	870	
548	878	886	894	902	910	918	926	933	941	949	
549	957	965	973	981	989	997					
	74 –	–	–	–	–	–	005	013	020	028	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
550	74 036	044	052	060	068	076	084	092	099	107	8
551	115	123	131	139	147	155	162	170	178	186	1 | 1
552	194	202	210	218	225	233	241	249	257	265	2 | 2
553	273	280	288	296	304	312	320	327	335	343	3 | 2
554	351	359	367	374	382	390	398	406	414	421	4 | 3
555	429	437	445	453	461	468	476	484	492	500	5 | 4
556	507	515	523	531	539	547	554	562	570	578	6 | 5
557	586	593	601	609	617	624	632	640	648	656	7 | 6
558	663	671	679	687	695	702	710	718	726	733	8 | 6
559	741	749	757	764	772	780	788	796	803	811	9 | 7
560	819	827	834	842	850	858	865	873	881	889	7
561	896	904	912	920	927	935	943	950	958	966	1 | 1
562	974	981	989	997							2 | 1
	75 –	–	–	–	005	012	020	028	035	043	3 | 2
563	051	059	066	074	082	089	097	105	113	120	4 | 3
564	128	136	143	151	159	166	174	182	189	197	5 | 4
565	205	213	220	228	236	243	251	259	266	274	6 | 4
566	282	289	297	305	312	320	328	335	343	351	7 | 5
567	358	366	374	381	389	397	404	412	420	427	8 | 6
568	435	442	450	458	465	473	481	488	496	504	9 | 6
569	511	519	526	534	542	549	557	565	572	580	
570	587	595	603	610	618	626	633	641	648	656	
571	664	671	679	686	694	702	709	717	724	732	
572	740	747	755	762	770	778	785	793	800	808	
573	815	823	831	838	846	853	861	868	876	884	
574	891	899	906	914	921	929	937	944	952	959	
575	967	974	982	989	997						
	76 –	–	–	–	–	005	012	020	027	035	
576	042	050	057	065	072	080	087	095	103	110	
577	118	125	133	140	148	155	163	170	178	185	
578	193	200	208	215	223	230	238	245	253	260	
579	268	275	283	290	298	305	313	320	328	335	
580	343	350	358	365	373	380	388	395	403	410	
581	418	425	433	440	448	455	462	470	477	485	
582	492	500	507	515	522	530	537	545	552	559	
583	567	574	582	589	597	604	612	619	626	634	
584	641	649	656	664	671	678	686	693	701	708	
585	716	723	730	738	745	753	760	768	775	782	
586	790	797	805	812	819	827	834	842	849	856	
587	864	871	879	886	893	901	908	916	923	930	
588	938	945	953	960	967	975	982	989	997		
	77 –	–	–	–	–	–	–	–	–	004	
589	012	019	026	034	041	048	056	063	070	078	
590	085	093	100	107	115	122	129	137	144	151	
591	159	166	173	181	188	195	203	210	217	225	
592	232	240	247	254	262	269	276	283	291	298	
593	305	313	320	327	335	342	349	357	364	371	
594	379	386	393	401	408	415	422	430	437	444	
595	452	459	466	474	481	488	495	503	510	517	
596	525	532	539	546	554	561	568	576	583	590	
597	597	605	612	619	627	634	641	648	656	663	
598	670	677	685	692	699	706	714	721	728	735	
599	743	750	757	764	772	779	786	793	801	808	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
600	77 815	822	830	837	844	851	859	866	873	880	8
601	887	895	902	909	916	924	931	938	945	952	1 1
602	960	967	974	981	988	996					2 2
	78 —	—	—	—	—	—	003	010	017	025	3 2
603	032	039	046	053	061	068	075	082	089	097	4 3
604	104	111	118	125	132	140	147	154	161	168	5 4
											6 5
605	176	183	190	197	204	211	219	226	233	240	7 6
606	247	254	262	269	276	283	290	297	305	312	8 6
607	319	326	333	340	347	355	362	369	376	383	9 7
608	390	398	405	412	419	426	433	440	447	455	
609	462	469	476	483	490	497	504	512	519	526	
610	533	540	547	554	561	569	576	583	590	597	
											7
611	604	611	618	625	633	640	647	654	661	668	1 1
612	675	682	689	696	704	711	718	725	732	739	2 1
613	746	753	760	767	774	781	789	796	803	810	3 2
											4 3
614	817	824	831	838	845	852	859	866	873	880	5 4
615	888	895	902	909	916	923	930	937	944	951	6 4
616	958	965	972	979	986	993					7 5
	79 —	—	—	—	—	—	000	007	014	021	8 6
617	029	036	043	050	057	064	071	078	085	092	9 6
618	099	106	113	120	127	134	141	148	155	162	
619	169	176	183	190	197	204	211	218	225	232	
											6
620	239	246	253	260	267	274	281	288	295	302	1 1
621	309	316	323	330	337	344	351	358	365	372	2 1
622	379	386	393	400	407	414	421	428	435	442	3 2
											4 2
623	449	456	463	470	477	484	491	498	505	511	5 3
624	518	525	532	539	546	553	560	567	574	581	6 4
625	588	595	602	609	616	623	630	637	644	650	7 4
											8 5
626	657	664	671	678	685	692	699	706	713	720	9 5
627	727	734	741	748	754	761	768	775	782	789	
628	796	803	810	817	824	831	837	844	851	858	
629	865	872	879	886	893	900	906	913	920	927	
630	934	941	948	955	962	969	975	982	989	996	
631	80 003	010	017	024	030	037	044	051	058	065	
632	072	079	085	092	099	106	113	120	127	134	
633	140	147	154	161	168	175	182	188	195	202	
634	209	216	223	229	236	243	250	257	264	271	
635	277	284	291	298	305	312	318	325	332	339	
636	346	353	359	366	373	380	387	393	400	407	
637	414	421	428	434	441	448	455	462	468	475	
638	482	489	496	502	509	516	523	530	536	543	
639	550	557	564	570	577	584	591	598	604	611	
640	618	625	632	638	645	652	659	665	672	679	
641	686	693	699	706	713	720	726	733	740	747	
642	754	760	767	774	781	787	794	801	808	814	
643	821	828	835	841	848	855	862	868	875	882	
644	889	895	902	909	916	922	929	936	943	949	
645	956	963	969	976	983	990	996				
	81 —	—	—	—	—	—	—	003	010	017	
646	023	030	037	043	050	057	064	070	077	084	
647	090	097	104	111	117	124	131	137	144	151	
648	158	164	171	178	184	191	198	204	211	218	
649	224	231	238	245	251	258	265	271	278	285	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
650	81 291	298	305	311	318	325	331	338	345	351	7
651	358	365	371	378	385	391	398	405	411	418	1 1
652	425	431	438	445	451	458	465	471	478	485	2 1
											3 2
653	491	498	505	511	518	525	531	538	544	551	4 3
654	558	564	571	578	584	591	598	604	611	617	5 4
655	624	631	637	644	651	657	664	671	677	684	6 4
											7 5
656	690	697	704	710	717	723	730	737	743	750	8 6
657	757	763	770	776	783	790	796	803	809	816	9 6
658	823	829	836	842	849	856	862	869	875	882	
659	889	895	902	908	915	921	928	935	941	948	
660	954	961	968	974	981	987	994				
	82 –	–	–	–	–	–		000	007	014	6
661	020	027	033	040	046	053	060	066	073	079	1 1
662	086	092	099	105	112	119	125	132	138	145	2 1
											3 2
663	151	158	164	171	178	184	191	197	204	210	4 2
664	217	223	230	236	243	249	256	263	269	276	5 3
											6 4
665	282	289	295	302	308	315	321	328	334	341	7 4
666	347	354	360	367	373	380	387	393	400	406	8 5
667	413	419	426	432	439	445	452	458	465	471	9 5
668	478	484	491	497	504	510	517	523	530	536	
669	543	549	556	562	569	575	582	588	595	601	
670	607	614	620	627	633	640	646	653	659	666	
671	672	679	685	692	698	705	711	718	724	730	
672	737	743	750	756	763	769	776	782	789	795	
673	802	808	814	821	827	834	840	847	853	860	
674	866	872	879	885	892	898	905	911	918	924	
675	930	937	943	950	956	963	969	975	982	988	
676	995										
	83 –	001	008	014	020	027	033	040	046	052	
677	059	065	072	078	085	091	097	104	110	117	
678	123	129	136	142	149	155	161	168	174	181	
679	187	193	200	206	213	219	225	232	238	245	
680	251	257	264	270	276	283	289	296	302	308	
681	315	321	327	334	340	347	353	359	366	372	
682	378	385	391	398	404	410	417	423	429	436	
683	442	448	455	461	467	474	480	487	493	499	
684	506	512	518	525	531	537	544	550	556	563	
685	569	575	582	588	594	601	607	613	620	626	
686	632	639	645	651	658	664	670	677	683	689	
687	696	702	708	715	721	727	734	740	746	753	
688	759	765	771	778	784	790	797	803	809	816	
689	822	828	835	841	847	853	860	866	872	879	
690	885	891	897	904	910	916	923	929	935	942	
691	948	954	960	967	973	979	985	992	998		
	84 –	–	–	–	–	–	–	–	–	004	
692	011	017	023	029	036	042	048	055	061	067	
693	073	080	086	092	098	105	111	117	123	130	
694	136	142	148	155	161	167	173	180	186	192	
695	198	205	211	217	223	230	236	242	248	255	
696	261	267	273	280	286	292	298	305	311	317	
697	323	330	336	342	348	354	361	367	373	379	
698	386	392	398	404	410	417	423	429	435	442	
699	448	454	460	466	473	479	485	491	497	504	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
700	84 510	516	522	528	535	541	547	553	559	566	7
701	572	578	584	590	597	603	609	615	621	628	1 1
											2 1
702	634	640	646	652	658	665	671	677	683	689	3 2
703	696	702	708	714	720	726	733	739	745	751	4 3
704	757	763	770	776	782	788	794	800	807	813	5 4
											6 4
705	819	825	831	837	844	850	856	862	868	874	7 5
706	880	887	893	899	905	911	917	924	930	936	8 6
											9 6
707	942	948	954	960	967	973	979	985	991	997	
708	85 003	009	016	022	028	034	040	046	052	058	
709	065	071	077	083	089	095	101	107	114	120	
											6
710	126	132	138	144	150	156	163	169	175	181	1 1
711	187	193	199	205	211	217	224	230	236	242	2 1
											3 2
712	248	254	260	266	272	278	285	291	297	303	4 2
713	309	315	321	327	333	339	345	352	358	364	5 3
714	370	376	382	388	394	400	406	412	418	425	6 4
											7 4
715	431	437	443	449	455	461	467	473	479	485	8 5
716	491	497	503	509	516	522	528	534	540	546	9 5
717	552	558	564	570	576	582	588	594	600	606	
718	612	618	625	631	637	643	649	655	661	667	
719	673	679	685	691	697	703	709	715	721	727	
											5
720	733	739	745	751	757	763	769	775	781	788	1 1
721	794	800	806	812	818	824	830	836	842	848	2 1
											3 2
722	854	860	866	872	878	884	890	896	902	908	4 2
723	914	920	926	932	938	944	950	956	962	968	5 3
724	974	980	986	992	998						6 3
	86 –	–	–	–	–	004	010	016	022	028	7 4
											8 4
725	034	040	046	052	058	064	070	076	082	088	9 5
726	094	100	106	112	118	124	130	136	141	147	
727	153	159	165	171	177	183	189	195	201	207	
728	213	219	225	231	237	243	249	255	261	267	
729	273	279	285	291	297	303	308	314	320	326	
730	332	338	344	350	356	362	368	374	380	386	
731	392	398	404	410	415	421	427	433	439	445	
732	451	457	463	469	475	481	487	493	499	504	
733	510	516	522	528	534	540	546	552	558	564	
734	570	576	581	587	593	599	605	611	617	623	
735	629	635	641	646	652	658	664	670	676	682	
736	688	694	700	705	711	717	723	729	735	741	
737	747	753	759	764	770	776	782	788	794	800	
738	806	812	817	823	829	835	841	847	853	859	
739	864	870	876	882	888	894	900	906	911	917	
740	923	929	935	941	947	953	958	964	970	976	
741	982	988	994	999							
	87 –	–	–	–	005	011	017	023	029	035	
742	040	046	052	058	064	070	075	081	087	093	
743	099	105	111	116	122	128	134	140	146	151	
744	157	163	169	175	181	186	192	198	204	210	
745	216	221	227	233	239	245	251	256	262	268	
746	274	280	286	291	297	303	309	315	320	326	
747	332	338	344	349	355	361	367	373	379	384	
748	390	396	402	408	413	419	425	431	437	442	
749	448	454	460	466	471	477	483	489	495	500	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
750	87 506	512	518	523	529	535	541	547	552	558	6
751	564	570	576	581	587	593	599	604	610	616	1 1
752	622	628	633	639	645	651	656	662	668	674	2 1
											3 2
753	679	685	691	697	703	708	714	720	726	731	4 2
754	737	743	749	754	760	766	772	777	783	789	5 3
755	795	800	806	812	818	823	829	835	841	846	6 4
											7 4
756	852	858	864	869	875	881	887	892	898	904	8 5
757	910	915	921	927	933	938	944	950	955	961	9 5
758	967	973	978	984	990	996					
	88 —	—	—	—	—	—	001	007	013	018	
759	024	030	036	041	047	053	058	064	070	076	
											5
760	081	087	093	098	104	110	116	121	127	133	1 1
761	138	144	150	156	161	167	173	178	184	190	2 1
762	195	201	207	213	218	224	230	235	241	247	3 2
											4 2
763	252	258	264	270	275	281	287	292	298	304	5 3
764	309	315	321	326	332	338	343	349	355	360	6 3
											7 4
765	366	372	377	383	389	395	400	406	412	417	8 4
766	423	429	434	440	446	451	457	463	468	474	9 5
767	480	485	491	497	502	508	513	519	525	530	
768	536	542	547	553	559	564	570	576	581	587	
769	593	598	604	610	615	621	627	632	638	643	
770	649	655	660	666	672	677	683	689	694	700	
771	705	711	717	722	728	734	739	745	750	756	
772	762	767	773	779	784	790	795	801	807	812	
773	818	824	829	835	840	846	852	857	863	868	
774	874	880	885	891	897	902	908	913	919	925	
775	930	936	941	947	953	958	964	969	975	981	
776	986	992	997								
	89 —	—	—	003	009	014	020	025	031	037	
777	042	048	053	059	064	070	076	081	087	092	
778	098	104	109	115	120	126	131	137	143	148	
779	154	159	165	170	176	182	187	193	198	204	
780	209	215	221	226	232	237	243	248	254	260	
781	265	271	276	282	287	293	298	304	310	215	
782	321	326	332	337	343	348	354	360	365	371	
783	376	382	387	393	398	404	409	415	421	426	
784	432	437	443	448	454	459	465	470	476	481	
785	487	492	498	504	509	515	520	526	531	537	
786	542	548	553	559	564	570	575	581	586	592	
787	597	603	609	614	620	625	631	636	642	647	
788	653	658	664	669	675	680	686	691	697	702	
789	708	713	719	724	730	735	741	746	752	757	
790	763	768	774	779	785	790	796	801	807	812	
791	818	823	829	834	840	845	851	856	862	867	
792	873	878	883	889	894	900	905	911	916	922	
793	927	933	938	944	949	955	960	966	971	977	
794	982	988	993	998							
	90 —	—	—	—	004	009	015	020	026	031	
795	037	042	048	053	059	064	069	075	080	086	
796	091	097	102	108	113	119	124	129	135	140	
797	146	151	157	162	168	173	179	184	189	195	
798	200	206	211	217	222	227	233	238	244	249	
799	255	260	266	271	276	282	287	293	298	304	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
800	90 309	314	320	325	331	336	342	347	352	358	6
801	363	369	374	380	385	390	396	401	407	412	1 1
802	417	423	428	434	439	445	450	455	461	466	2 1
803	472	477	482	488	493	499	504	509	515	520	3 2
804	526	531	536	542	547	553	558	563	569	574	4 2
805	580	585	590	596	601	607	612	617	623	628	5 3
806	634	639	644	650	655	660	666	671	677	682	6 4
807	687	693	698	703	709	714	720	725	730	736	7 4
808	741	747	752	757	763	768	773	779	784	789	8 5
809	795	800	806	811	816	822	827	832	838	843	9 5
810	849	854	859	865	870	875	881	886	891	897	
811	902	907	913	918	924	929	934	940	945	950	
812	956	961	966	972	977	982	988	993	998		
	91 –	–	–	–	–	–	–	–	–	004	5
813	009	014	020	025	030	036	041	046	052	057	1 1
814	062	068	073	078	084	089	094	100	105	110	2 1
815	116	121	126	132	137	142	148	153	158	164	3 2
816	169	174	180	185	190	196	201	206	212	217	4 2
817	222	228	233	238	243	249	254	259	265	270	5 3
818	275	281	286	291	297	302	307	312	318	323	6 3
819	328	334	339	344	350	355	360	365	371	376	7 4
820	381	387	392	397	403	408	413	418	424	429	8 4
821	434	440	445	450	455	461	466	471	477	482	9 5
822	487	492	498	503	508	514	519	524	529	535	
823	540	545	551	556	561	566	572	577	582	587	
824	593	598	603	609	614	619	624	630	635	640	
825	645	651	656	661	666	672	677	682	687	693	
826	698	703	709	714	719	724	730	735	740	745	
827	751	756	761	766	772	777	782	787	793	798	
828	803	808	814	819	824	829	834	840	845	850	
829	855	861	866	871	876	882	887	892	897	903	
830	908	913	918	924	929	934	939	944	950	955	
831	960	965	971	976	981	986	991	997			
	92 –	–	–	–	–	–	–	–	002	007	
832	012	018	023	028	033	038	044	049	054	059	
833	065	070	075	080	085	091	096	101	106	111	
834	117	122	127	132	137	143	148	153	158	163	
835	169	174	179	184	189	195	200	205	210	215	
836	221	226	231	236	241	247	252	257	262	267	
837	273	278	283	288	293	298	304	309	314	319	
838	324	330	335	340	345	350	355	361	366	371	
839	376	381	387	392	397	402	407	412	418	423	
840	428	433	438	443	449	454	459	464	469	474	
841	480	485	490	495	500	505	511	516	521	526	
842	531	536	542	547	552	557	562	567	572	578	
843	583	588	593	598	603	609	614	619	624	629	
844	634	639	645	650	655	660	665	670	675	681	
845	686	691	696	701	706	711	716	722	727	732	
846	737	742	747	752	758	763	768	773	778	783	
847	788	793	799	804	809	814	819	824	829	834	
848	840	845	850	855	860	865	870	875	881	886	
849	891	896	901	906	911	916	921	927	932	937	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
850	92 942	947	952	957	962	967	973	978	983	988	4
851	993	998									1 0
	93 –	–	003	008	013	018	024	029	234	039	2 1
852	044	049	054	059	064	069	075	080	085	090	3 1
853	095	100	105	110	115	120	125	131	136	141	4 2
											5 2
854	146	151	156	161	166	171	176	181	186	192	6 2
855	197	202	207	212	217	222	227	232	237	242	7 3
856	247	252	258	263	268	273	278	283	288	293	8 3
											9 4
857	298	303	308	313	318	323	328	334	339	344	
858	349	354	359	364	369	374	379	384	389	394	
859	399	404	409	414	420	425	430	435	440	445	
860	450	455	460	465	470	475	480	485	490	495	
861	500	505	510	515	520	526	531	536	541	546	
862	551	556	561	566	571	576	581	586	591	596	
863	601	606	611	616	621	626	631	636	641	646	
864	651	656	661	666	671	676	682	687	692	697	
865	702	707	712	717	722	727	732	737	742	747	
866	752	757	762	767	772	777	782	787	792	797	
867	802	807	812	817	822	827	832	837	842	847	
868	852	857	862	867	872	877	882	887	892	897	
869	902	907	912	917	922	927	932	937	942	947	
870	952	957	962	967	972	977	982	987	992	997	
871	94 002	007	012	017	022	027	032	037	042	047	
872	052	057	062	067	072	077	082	086	091	096	
873	101	106	111	116	121	126	131	136	141	146	
874	151	156	161	166	171	176	181	186	191	196	
875	201	206	211	216	221	226	231	236	240	245	
876	250	255	260	265	270	275	280	285	290	295	
877	300	305	310	315	320	325	330	335	340	345	
878	349	354	359	364	369	374	379	384	389	394	
879	399	404	409	414	419	424	429	433	438	443	
880	448	453	458	463	468	473	478	483	488	493	
881	498	503	507	512	517	522	527	532	537	542	
882	547	552	557	562	567	571	576	581	586	591	
883	596	601	606	611	616	621	626	630	635	640	
884	645	650	655	660	665	670	675	680	685	689	
885	694	699	704	709	714	719	724	729	734	738	
886	743	748	753	758	763	768	773	778	783	787	
887	792	797	802	807	812	817	822	827	832	836	
888	841	846	851	856	861	866	871	876	880	885	
889	890	895	900	905	910	915	919	924	929	934	
890	939	944	949	954	959	963	968	973	978	983	
891	988	993	998								
	95 –	–	–	002	007	012	017	022	027	032	
892	036	041	046	051	056	061	066	071	075	080	
893	085	090	095	100	105	109	114	119	124	129	
894	134	139	143	148	153	158	163	168	173	177	
895	182	187	192	197	202	207	211	216	221	226	
896	231	236	240	245	250	255	260	265	270	274	
897	279	284	289	294	299	303	308	313	318	323	
898	328	332	337	342	347	352	357	361	366	371	
899	376	381	386	390	395	400	405	410	415	419	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
900	95 424	429	434	439	444	448	453	458	463	468	5
901	472	477	482	487	492	497	501	506	511	516	1 | 1
											2 | 1
902	521	525	530	535	540	545	550	554	559	564	3 | 2
903	569	574	578	583	588	593	598	602	607	612	4 | 2
904	617	622	626	631	636	641	646	650	655	660	5 | 3
											6 | 3
905	665	670	674	679	684	689	694	698	703	708	7 | 4
906	713	718	722	727	732	737	742	746	751	756	8 | 4
											9 | 5
907	761	766	770	775	780	785	789	794	799	804	
908	809	813	818	823	828	832	837	842	847	852	
909	856	861	866	871	875	880	885	890	895	899	
910	904	909	914	918	923	928	933	938	942	947	4
911	952	957	961	966	971	976	980	985	990	995	1 | 0
912	999										2 | 1
	96 –	004	009	014	019	023	028	033	038	042	3 | 1
913	047	052	057	061	066	071	076	080	085	090	4 | 2
914	095	099	104	109	114	118	123	128	133	137	5 | 2
											6 | 2
915	142	147	152	156	161	166	171	175	180	185	7 | 3
916	190	194	199	204	209	213	218	223	227	232	8 | 3
											9 | 4
917	237	242	246	251	256	261	265	270	275	280	
918	284	289	294	298	303	308	313	317	322	327	
919	332	336	341	346	350	355	360	365	369	374	
920	379	384	388	393	398	402	407	412	417	421	
921	426	431	435	440	445	450	454	459	464	468	
922	473	478	483	487	492	497	501	506	511	515	
923	520	525	530	534	539	544	548	553	558	562	
924	567	572	577	581	586	591	595	600	605	609	
925	614	619	624	628	633	638	642	647	652	656	
926	661	666	670	675	680	685	689	694	699	703	
927	708	713	717	722	727	731	736	741	745	750	
928	755	759	764	769	774	778	783	788	792	797	
929	802	806	811	816	820	825	830	834	839	844	
930	848	853	858	862	867	872	876	881	886	890	
931	895	900	904	909	914	918	923	928	932	937	
932	942	946	951	956	960	965	970	974	979	984	
933	988	993	997								
	97 –	–	–	002	007	011	016	021	025	030	
934	035	039	044	049	053	058	063	067	072	077	
935	081	086	090	095	100	104	109	114	118	123	
936	128	132	137	142	146	151	155	160	165	169	
937	174	179	183	188	192	197	202	206	211	216	
938	220	225	230	234	239	243	248	253	257	262	
939	267	271	276	280	285	290	294	299	304	308	
940	313	317	322	327	331	336	340	345	350	354	
941	359	364	368	373	377	382	387	391	396	400	
942	405	410	414	419	424	428	433	437	442	447	
943	451	456	460	465	470	474	479	483	488	493	
944	497	502	506	511	516	520	525	529	534	539	
945	543	548	552	557	562	566	571	575	580	585	
946	589	594	598	603	607	612	617	621	626	630	
947	635	640	644	649	653	658	663	667	672	676	
948	681	685	690	695	699	704	708	713	717	722	
949	727	731	736	740	745	749	754	759	763	768	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

No.	0	1	2	3	4	5	6	7	8	9	Diff.
950	97 772	777	782	786	791	795	800	804	809	813	5
951	818	823	827	832	836	841	845	850	855	859	1 1
											2 1
952	864	868	873	877	882	886	891	896	900	905	3 2
953	909	914	918	923	928	932	937	941	946	950	4 2
954	955	959	964	968	973	978	982	987	991	996	5 3
											6 3
955	98 000	005	009	014	019	023	028	032	037	041	7 4
956	046	050	055	059	064	068	073	078	082	087	8 4
											9 5
957	091	096	100	105	109	114	118	123	127	132	
958	137	141	146	150	155	159	164	168	173	177	
959	182	186	191	195	200	204	209	214	218	223	
											4
960	227	232	236	241	245	250	254	259	263	268	1 0
961	272	277	281	286	290	295	299	304	308	313	2 1
											3 1
962	318	322	327	331	336	340	345	349	354	358	4 2
963	363	367	372	376	381	385	390	394	399	403	5 2
964	408	412	417	421	426	430	435	439	444	448	6 2
											7 3
965	453	457	462	466	471	475	480	484	489	493	8 3
966	498	502	507	511	516	520	525	529	534	538	9 4
967	543	547	552	556	561	565	570	574	579	583	
968	588	592	597	601	605	610	614	619	623	628	
969	632	637	641	646	650	655	659	664	668	673	
970	677	682	686	691	695	700	704	709	713	717	
971	722	726	731	735	740	744	749	753	758	762	
972	767	771	776	780	784	789	793	798	802	807	
973	811	816	820	825	829	834	838	843	847	851	
974	856	860	865	869	874	878	883	887	892	896	
975	900	905	909	914	918	923	927	932	936	941	
976	945	949	954	958	963	967	972	976	981	985	
977	989	994	998								
	99 –	–	–	003	007	012	016	021	025	029	
978	034	038	043	047	052	056	061	065	069	074	
979	078	083	087	092	096	100	105	109	114	118	
980	123	127	131	136	140	145	149	154	158	162	
981	167	171	176	180	185	189	193	198	202	207	
982	211	216	220	224	229	233	238	242	247	251	
983	255	260	264	269	273	277	282	286	291	295	
984	300	304	308	313	317	322	326	330	335	339	
985	344	348	352	357	361	366	370	374	379	383	
986	388	392	396	401	405	410	414	419	423	427	
987	432	436	441	445	449	454	458	463	467	471	
988	476	480	484	489	493	498	502	506	511	515	
989	520	524	528	533	537	542	546	550	555	559	
990	564	568	572	577	581	585	590	594	599	603	
991	607	612	616	621	625	629	634	638	642	647	
992	651	656	660	664	669	673	677	682	686	691	
993	695	699	704	708	712	717	721	726	730	734	
994	739	743	747	752	756	760	765	769	774	778	
995	782	787	791	795	800	804	808	813	817	822	
996	826	830	835	839	843	848	852	856	861	865	
997	870	874	878	883	887	891	896	900	904	909	
998	913	917	922	926	930	935	939	944	948	952	
999	957	961	965	970	974	978	983	987	991	996	
No.	0	1	2	3	4	5	6	7	8	9	Diff.

TABLE XII.—Diurnal Logarithms for readily finding the correction of the Sun's Declination, &c.

Min. or Sec.	Hours, Degrees, or Minutes.											
	0	1	2	3	4	5	6	7	8	9	10	11
0	∞	1.3802	1.0792	9031	7782	6812	6021	5351	4771	4260	3802	3388
1	3.1584	1.3730	1.0756	9007	7764	6798	6009	5341	4762	4252	3795	3382
2	2.8573	1.3660	1.0720	8983	7745	6784	5997	5331	4753	4244	3788	3375
3	2.6812	1.3590	1.0685	8959	7728	6769	5985	5320	4744	4236	3781	3369
4	2.5563	1.3522	1.0649	8936	7710	6755	5973	5310	4735	4228	3773	3362
5	2.4594	1.3455	1.0615	8912	7692	6741	5961	5300	4726	4220	3766	3355
6	2.3802	1.3388	1.0580	8889	7674	6726	5949	5290	4717	4212	3759	3349
7	2.3133	1.3323	1.0546	8865	7657	6712	5937	5279	4708	4204	3752	3342
8	2.2553	1.3259	1.0512	8842	7639	6698	5925	5269	4699	4196	3745	3336
9	2.2041	1.3195	1.0478	8819	7622	6684	5913	5259	4691	4188	3738	3329
10	2.1584	1.3133	1.0444	8796	7604	6670	5902	5249	4682	4180	3730	3323
11	2.1170	1.3071	1.0411	8773	7587	6656	5890	5239	4673	4172	3723	3316
12	2.0792	1.3010	1.0378	8751	7570	6642	5878	5229	4664	4164	3716	3310
13	2.0444	1.2950	1.0345	8728	7552	6628	5867	5219	4655	4156	3709	3304
14	2.0122	1.2891	1.0313	8706	7535	6614	5855	5209	4646	4149	3702	3297
15	1.9823	1.2833	1.0280	8683	7518	6601	5843	5199	4638	4141	3695	3291
16	1.9542	1.2776	1.0248	8661	7501	6587	5832	5189	4629	4133	3688	3284
17	1.9280	1.2719	1.0216	8639	7484	6573	5821	5179	4620	4125	3681	3278
18	1.9031	1.2663	1.0185	8617	7467	6559	5809	5169	4611	4117	3674	3271
19	1.8796	1.2607	1.0154	8595	7451	6546	5797	5159	4603	4110	3667	3265
20	1.8573	1.2553	1.0122	8573	7434	6532	5786	5149	4594	4102	3660	3258
21	1.8361	1.2499	1.0091	8552	7417	6519	5774	5139	4585	4094	3653	3252
22	1.8159	1.2446	1.0061	8530	7401	6505	5763	5129	4577	4086	3646	3246
23	1.7966	1.2393	1.0030	8509	7384	6492	5752	5120	4568	4079	3639	3239
24	1.7782	1.2341	1.0000	8487	7368	6478	5740	5110	4559	4071	3632	3233
25	1.7604	1.2289	0.9970	8466	7351	6465	5729	5100	4551	4063	3625	3227
26	1.7434	1.2239	9940	8445	7335	6451	5718	5090	4542	4056	3618	3220
27	1.7270	1.2188	9911	8424	7319	6438	5707	5081	4534	4048	3611	3214
28	1.7112	1.2139	9881	8403	7302	6426	5695	5071	4525	4040	3604	3208
29	1.6960	1.2090	9852	8382	7286	6413	5684	5061	4517	4033	3597	3201
30	1.6812	1.2041	9823	8361	7270	6399	5673	5052	4508	4025	3590	3195
31	1.6670	1.1993	9794	8341	7254	6385	5662	5042	4499	4017	3583	3189
32	1.6532	1.1946	9765	8320	7238	6372	5651	5032	4491	4010	3577	3183
33	1.6399	1.1900	9737	8300	7222	6359	5640	5023	4483	4002	3570	3176
34	1.6269	1.1852	9708	8280	7206	6346	5629	5013	4474	3995	3563	3170
35	1.6143	1.1806	9680	8259	7190	6333	5618	5004	4466	3987	3556	3164
36	1.6021	1.1761	9652	8239	7175	6320	5607	4994	4457	3979	3549	3158
37	1.5902	1.1716	9625	8219	7159	6307	5596	4985	4449	3972	3542	3151
38	1.5786	1.1671	9597	8199	7143	6295	5585	4975	4440	3964	3535	3145
39	1.5673	1.1627	9570	8179	7128	6282	5574	4966	4432	3957	3529	3139
40	1.5563	1.1584	9542	8159	7112	6269	5563	4956	4424	3949	3522	3133
41	1.5456	1.1540	9515	8140	7097	6256	5552	4947	4415	3942	3515	3127
42	1.5351	1.1498	9489	8120	7081	6243	5541	4937	4407	3934	3508	3120
43	1.5249	1.1455	9462	8101	7066	6231	5531	4928	4399	3927	3502	3114
44	1.5149	1.1413	9435	8081	7051	6218	5520	4919	4390	3920	3495	3108
45	1.5052	1.1372	9409	8062	7035	6205	5509	4909	4382	3912	3488	3102
46	1.4956	1.1331	9383	8043	7020	6193	5498	4900	4374	3905	3481	3096
47	1.4863	1.1290	9357	8023	7005	6180	5488	4891	4366	3897	3475	3089
48	1.4771	1.1249	9331	8004	6990	6168	5477	4881	4357	3890	3468	3083
49	1.4682	1.1209	9305	7985	6975	6155	5466	4872	4349	3883	3461	3077
50	1.4594	1.1170	9279	7966	6960	6143	5456	4863	4341	3875	3455	3071
51	1.4508	1.1130	9254	7948	6945	6131	5445	4853	4333	3868	3448	3065
52	1.4424	1.1092	9228	7929	6930	6118	5435	4844	4325	3860	3441	3059
53	1.4341	1.1053	9203	7910	6915	6106	5424	4835	4316	3853	3435	3053
54	1.4260	1.1015	9178	7892	6900	6094	5414	4826	4308	3846	3428	3047
55	1.4180	1.0977	9153	7873	6885	6081	5403	4817	4300	3839	3421	3041
56	1.4102	1.0939	9129	7855	6871	6069	5393	4808	4292	3831	3415	3035
57	1.4025	1.0902	9104	7836	6856	6057	5382	4799	4284	3824	3408	3028
58	1.3949	1.0865	9079	7818	6842	6045	5372	4789	4276	3817	3401	3022
59	1.3875	1.0828	9055	7800	6827	6033	5362	4780	4268	3809	3395	3016
60	1.3802	1.0792	9031	7782	6812	6021	5351	4771	4260	3802	3388	3010

TABLE XII.—Diurnal Logarithms for readily finding the correction of the Sun's Declination, &c.

Min. or Sec.	Hours, Degrees, or Minutes.											
	12	13	14	15	16	17	18	19	20	21	22	23
0	3010	2663	2341	2041	1761	1498	1249	1015	0792	0580	0378	0185
1	3004	2657	2336	2036	1756	1493	1245	1011	0788	0577	0375	0182
2	2998	2652	2331	2031	1752	1489	1241	1007	0785	0573	0371	0179
3	2992	2646	2325	2027	1747	1485	1237	1003	0781	0570	0368	0175
4	2986	2641	2320	2022	1743	1481	1233	0999	0777	0566	0365	0172
5	2980	2635	2315	2017	1738	1476	1229	0996	0774	0563	0361	0169
6	2974	2629	2310	2012	1734	1472	1225	0992	0770	0559	0358	0166
7	2968	2624	2305	2008	1729	1468	1221	0988	0767	0556	0355	0163
8	2962	2618	2300	2003	1725	1464	1217	0984	0763	0552	0352	0160
9	2956	2613	2295	1998	1720	1460	1213	0980	0759	0549	0348	0157
10	2950	2607	2289	1993	1716	1455	1209	0977	0756	0546	0345	0153
11	2945	2602	2284	1989	1711	1451	1205	0973	0752	0542	0342	0150
12	2939	2596	2279	1984	1707	1447	1201	0969	0749	0539	0339	0146
13	2933	2591	2274	1979	1703	1443	1197	0965	0745	0535	0335	0144
14	2927	2585	2269	1974	1698	1438	1193	0962	0741	0532	0332	0141
15	2921	2580	2264	1969	1694	1434	1190	0958	0738	0528	0329	0138
16	2915	2575	2259	1965	1689	1430	1186	0954	0734	0525	0326	0135
17	2909	2569	2255	1960	1685	1426	1182	0950	0731	0522	0322	0132
18	2903	2564	2249	1955	1680	1422	1178	0947	0727	0518	0319	0129
19	2897	2558	2244	1951	1676	1417	1174	0943	0724	0515	0316	0125
20	2891	2553	2239	1946	1671	1413	1170	0939	0720	0511	0313	0122
21	2886	2547	2234	1941	1667	1409	1166	0935	0716	0508	0309	0119
22	2880	2542	2229	1936	1663	1405	1162	0932	0713	0505	0306	0116
23	2874	2537	2224	1932	1658	1401	1158	0928	0709	0501	0303	0113
24	2868	2531	2219	1927	1654	1397	1154	0924	0706	0498	0300	0110
25	2862	2526	2214	1922	1649	1393	1150	0920	0702	0495	0296	0107
26	2856	2520	2209	1918	1645	1388	1146	0917	0699	0491	0293	0104
27	2850	2515	2203	1913	1641	1384	1142	0913	0695	0488	0290	0101
28	2845	2510	2198	1908	1636	1380	1138	0909	0692	0484	0287	0098
29	2839	2504	2193	1904	1632	1376	1134	0905	0688	0481	0283	0094
30	2833	2499	2188	1899	1627	1372	1130	0902	0685	0478	0280	0091
31	2827	2493	2184	1894	1623	1368	1126	0898	0681	0474	0277	0088
32	2821	2488	2178	1890	1619	1364	1123	0895	0677	0471	0274	0085
33	2816	2483	2173	1885	1614	1359	1119	0891	0674	0468	0271	0082
34	2810	2477	2169	1880	1610	1355	1115	0887	0670	0464	0267	0079
35	2804	2472	2164	1876	1605	1351	1111	0883	0667	0461	0264	0076
36	2798	2467	2159	1871	1601	1347	1107	0880	0663	0458	0261	0073
37	2793	2461	2154	1866	1597	1343	1103	0876	0660	0454	0258	0070
38	2787	2456	2149	1862	1592	1339	1099	0872	0656	0451	0255	0067
39	2781	2451	2144	1857	1588	1335	1095	0868	0653	0447	0251	0064
40	2776	2446	2139	1852	1584	1331	1092	0865	0649	0444	0248	0061
41	2770	2440	2134	1848	1579	1327	1088	0861	0646	0441	0245	0058
42	2764	2435	2129	1843	1575	1322	1084	0858	0642	0438	0242	0055
43	2758	2430	2124	1839	1571	1318	1080	0854	0639	0434	0239	0052
44	2753	2424	2119	1834	1566	1314	1076	0850	0635	0431	0236	0048
45	2746	2419	2114	1829	1562	1310	1072	0847	0632	0427	0232	0045
46	2741	2414	2109	1825	1558	1306	1068	0843	0628	0424	0229	0042
47	2736	2409	2104	1820	1553	1302	1064	0839	0625	0421	0226	0039
48	2730	2403	2099	1816	1549	1298	1061	0836	0621	0418	0223	0036
49	2724	2398	2095	1811	1545	1294	1057	0832	0618	0414	0220	0033
50	2719	2393	2090	1806	1540	1290	1053	0828	0614	0411	0216	0030
51	2713	2388	2085	1802	1536	1286	1049	0824	0611	0408	0213	0027
52	2708	2382	2080	1797	1532	1282	1045	0821	0608	0404	0210	0024
53	2702	2377	2075	1793	1528	1278	1041	0817	0604	0401	0207	0021
54	2696	2372	2070	1788	1523	1274	1037	0814	0601	0398	0204	0018
55	2691	2367	2065	1784	1519	1270	1034	0810	0597	0394	0201	0015
56	2685	2362	2061	1779	1515	1265	1030	0806	0594	0391	0197	0012
57	2679	2356	2056	1775	1510	1261	1026	0803	0590	0388	0194	0009
58	2674	2351	2051	1770	1506	1257	1022	0799	0587	0384	0191	0006
59	2668	2346	2046	1766	1502	1253	1018	0795	0583	0381	0188	0003
60	2663	2341	2041	1761	1498	1249	1015	0792	0580	0378	0185	0000

TABLE XIII.—Reduction of the Time of the Moon's Passage over the Meridian of Greenwich to the Time of her Passage over any other Meridian.

Long. in Deg.	Daily Variation of ☽'s Meridian Passage.													Long. in Time.
	m. 40	m. 42	m. 44	m. 46	m. 48	m. 50	m. 52	m. 54	m. 56	m. 58	m. 60	m. 62	m. 64	m. 66	h. m.
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0 0
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0 20
10	1	1	1	1	1	1	1	1	2	2	2	2	2	2	0 40
15	2	2	2	2	2	2	2	2	2	2	2	3	3	3	1 0
20	2	2	2	3	3	3	3	3	3	3	3	3	4	4	1 20
25	3	3	3	3	3	3	4	4	4	4	4	4	4	5	1 40
30	3	3	4	4	4	4	4	4	5	5	5	5	5	5	2 0
35	4	4	4	4	5	5	5	5	5	6	6	6	6	6	2 20
40	4	5	5	5	5	6	6	6	6	6	7	7	7	7	2 40
45	5	5	5	6	6	6	6	7	7	7	7	8	8	8	3 0
50	6	6	6	6	7	7	7	7	8	8	8	9	9	9	3 20
55	6	6	7	7	7	8	8	8	9	9	9	9	10	10	3 40
60	7	7	7	8	8	8	9	9	9	10	10	10	11	11	4 0
65	7	8	8	8	9	9	9	10	10	10	11	11	12	12	4 20
70	8	8	9	9	9	10	10	10	11	11	12	12	12	13	4 40
75	8	9	9	10	10	10	11	11	12	12	12	13	13	14	5 0
80	9	9	10	10	11	11	12	12	12	13	13	14	14	15	5 20
85	9	10	10	11	11	12	12	13	13	14	14	15	15	16	5 40
90	10	10	11	11	12	12	13	13	14	14	15	15	16	16	6 0
95	11	11	12	12	13	13	14	14	15	15	16	16	17	17	6 20
100	11	12	12	13	13	14	14	15	16	16	17	17	18	18	6 40
105	12	12	13	13	14	15	15	16	16	17	17	18	19	19	7 0
110	12	13	13	14	15	15	16	16	17	18	18	19	20	20	7 20
115	13	13	14	15	15	16	17	17	18	19	19	20	20	21	7 40
120	13	14	15	15	16	17	17	18	19	19	20	21	21	22	8 0
125	14	15	15	16	17	17	18	19	19	20	21	22	22	23	8 20
130	14	15	16	17	17	18	19	19	20	21	22	22	23	24	8 40
135	15	16	16	17	18	19	19	20	21	22	22	23	24	25	9 0
140	16	16	17	18	19	19	20	21	22	23	23	24	25	26	9 20
145	16	17	18	19	19	20	21	22	23	23	24	25	26	27	9 40
150	17	17	18	19	20	21	22	22	23	24	25	26	27	27	10 0
155	17	18	19	20	21	22	22	23	24	25	26	27	28	28	10 20
160	18	19	20	20	21	22	23	24	25	26	27	28	28	29	10 40
165	18	19	20	21	22	23	24	25	26	27	27	28	29	30	11 0
170	19	20	21	22	23	24	25	25	26	27	28	29	30	31	11 20
175	19	20	21	22	23	24	25	26	27	28	29	30	31	32	11 40
180	20	21	22	23	24	25	26	27	28	29	30	31	32	33	12 0
	m. 40	m. 42	m. 44	m. 46	m. 48	m. 50	m. 52	m. 54	m. 56	m. 58	m. 60	m. 62	m. 64	m. 66	

When the Longitude is WEST, *add* the correction.

When the Longitude is EAST, *subtract* the correction.

TABLE XIV.—Most favourable Altitudes for determining the Apparent Time.

Lat.	Declination of the Object.																			
	2°		4°		6°		8°		10°		12°		14°		16°		18°		20°		22°		24°	
°	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	30	1	14	29	9	37	7	12	5	46	4	49	4	8	3	38	3	14	2	55	2	40	2	28
2	90	0	30	1	19	30	14	31	11	36	9	40	8	18	7	17	6	29	5	52	5	21	4	55
3	41	49	48	37	30	3	22	5	17	32	14	35	12	30	10	57	9	45	8	48	8	2	7	24
4	30	1	90	0	41	52	30	5	23	41	19	36	16	45	14	40	13	3	11	46	10	44	9	53
5	23	36	53	10	56	30	38	46	30	8	24	47	21	7	18	26	16	23	14	46	13	27	12	22
6	19	30	41	52	90	0	48	40	40	9	30	11	25	36	22	17	19	46	17	48	16	12	14	53
7	16	38	34	55	59	4	61	7	44	34	35	53	30	15	26	14	23	14	20	52	18	59	17	26
8	14	31	30	5	48	41	90	0	53	16	42	1	35	7	30	20	26	46	24	1	21	48	20	1
9	12	23	26	29	41	56	62	50	64	16	48	48	40	17	34	35	30	25	27	13	24	41	22	37
10	11	35	23	41	37	0	53	17	90	0	56	38	45	52	39	3	34	11	30	30	27	37	25	16
11	10	32	21	27	33	13	46	50	65	31	69	36	52	4	43	48	38	8	33	55	30	47	27	59
12	9	40	19	36	30	11	42	2	56	39	90	0	59	15	48	58	42	17	37	26	33	42	30	44
13	8	55	18	4	27	41	38	13	50	32	67	33	68	25	54	42	46	43	41	8	36	54	33	35
14	8	18	16	45	25	36	35	7	45	53	59	15	90	0	61	22	51	31	45	1	40	13	36	30
15	7	45	15	38	23	49	32	32	42	8	53	27	69	11	69	53	56	53	49	11	43	43	39	31
16	7	16	14	40	22	17	30	20	39	4	48	59	61	23	90	0	63	6	50	12	47	22	42	39
17	6	51	13	43	20	57	28	26	36	26	45	20	55	50	70	31	71	7	58	44	51	18	45	57
18	6	29	13	3	19	46	26	46	34	11	42	17	51	32	63	8	90	0	64	37	55	34	49	26
19	6	9	12	22	18	44	25	18	32	14	39	41	48	0	57	51	71	39	72	9	60	21	53	10
20	5	51	11	46	17	48	24	1	30	31	37	27	45	2	53	43	64	40	90	0	65	54	57	13
21	5	35	11	13	16	57	22	51	28	59	35	28	42	28	50	17	59	34	72	37	73	4	61	46
22	5	21	10	44	16	12	21	49	27	37	33	43	40	14	47	22	55	35	65	56	90	0	67	5
23	5	7	10	17	15	31	20	52	26	23	32	9	38	15	44	52	52	16	61	5	73	29	73	52
24	4	55	9	53	14	53	20	1	25	17	30	45	36	30	42	40	49	27	57	15	67	6	90	0
25	4	44	9	30	14	19	19	14	24	16	29	28	34	55	40	43	46	59	54	2	62	25	74	14
26	4	34	9	9	13	48	18	31	23	21	28	19	33	30	38	58	44	50	51	18	58	44	68	7
27	4	25	8	50	13	19	17	51	22	29	27	15	32	12	37	23	42	54	48	53	55	36	63	37
28	4	16	8	33	12	52	17	15	21	43	26	17	31	1	35	57	41	10	46	47	52	57	60	3
29	4	8	8	16	12	27	16	41	20	59	25	23	29	56	34	39	39	36	44	55	50	37	57	2
30	4	0	8	1	12	4	16	10	20	19	24	34	28	56	33	57	38	11	43	10	48	32	54	26
31	3	53	7	47	11	43	15	41	19	42	23	48	28	1	32	21	36	52	41	37	46	40	52	9
32	3	47	7	34	11	23	15	14	19	8	23	6	27	10	31	20	35	41	40	12	45	0	50	8
33	3	40	7	22	11	4	14	48	18	36	22	26	26	22	30	24	34	34	38	54	43	27	48	19
34	3	35	7	10	10	46	14	25	18	8	21	50	25	38	29	32	33	33	37	43	42	4	46	40
35	3	29	6	59	10	30	14	3	17	37	21	15	24	57	28	43	32	36	36	36	40	47	45	10
36	3	24	6	49	10	15	13	42	17	11	20	43	24	18	27	58	31	43	35	35	39	36	43	48
37	3	19	6	39	10	0	13	22	16	46	20	12	23	42	27	16	30	54	34	38	38	30	42	31
38	3	15	6	31	9	47	13	4	16	23	19	44	23	9	26	36	30	8	33	45	37	29	41	22
39	3	11	6	22	9	34	12	47	16	1	19	17	22	36	25	59	29	24	32	55	36	32	40	16
40	3	7	6	14	9	21	12	30	15	40	18	52	22	7	25	24	28	44	32	9	35	39	39	15
42	2	59	5	59	8	59	11	59	15	3	18	6	22	12	24	20	27	30	30	45	34	3	37	26
44	2	53	5	46	8	39	11	33	14	29	17	25	20	23	23	23	26	25	29	30	32	38	35	50
46	2	47	5	34	8	21	11	10	13	58	16	48	19	39	22	32	25	27	28	24	31	23	34	26
48	2	41	5	23	8	5	10	48	13	31	16	15	19	0	21	46	24	34	27	27	30	16	33	11
50	2	36	5	13	7	50	10	28	13	6	15	45	18	25	21	5	23	48	26	32	29	17	32	4
52	2	32	5	5	7	37	10	11	12	44	15	18	17	53	20	29	23	6	25	44	28	23	31	5
54	2	28	4	57	7	25	9	54	12	24	14	53	17	24	19	55	22	28	25	1	27	35	30	11
56	2	25	4	50	7	14	9	40	12	6	14	32	16	58	19	25	21	53	24	22	26	52	29	23
58	2	22	4	43	7	4	9	27	11	49	14	12	16	35	18	58	21	22	23	47	26	13	28	40
60	2	19	4	37	6	56	9	15	11	34	13	54	16	15	18	33	20	54	23	16	25	38	28	1
62	2	16	4	31	6	48	9	4	11	21	13	37	15	54	18	12	20	30	22	48	25	7	27	26
64	2	14	4	27	6	41	8	53	11	9	13	23	15	37	17	53	20	7	22	22	24	38	26	54
66	2	12	4	22	6	34	8	44	10	58	13	10	15	22	17	34	19	46	22	0	24	13	26	26
68	2	9	4	19	6	28	8	37	10	48	12	58	15	8	17	18	19	28	21	39	23	50	26	1
70	2	8	4	15	6	23	8	31	10	39	12	47	14	55	17	3	19	12	21	21	23	30	25	39
72	2	6	4	12	6	19	8	25	10	31	12	38	14	44	16	51	18	54	21	5	23	12	25	19
74	2	5	4	9	6	15	8	20	10	25	12	30	14	35	16	40	18	45	20	51	22	56	25	2
76	2	4	4	7	6	11	8	15	10	19	12	23	14	27	16	30	18	34	20	39	22	43	24	47
78	2	3	4	5	6	8	8	11	10	14	12	16	14	19	16	22	18	25	20	29	22	31	24	34
80	2	2	4	4	6	5	8	8	10	10	12	11	14	14	16	15	18	17	20	20	22	22	24	24

TABLE XV. *a* and *b*.

DIFFERENCE OF LATITUDE,

AND

DEPARTURE.

TABLE XV. *a*.

Difference of Latitude.

Dist.	Angle of the Course.								
	0 Point.	¼ Point.	½ Point.	¾ Point.	1 Point.	1¼ Point.	1½ Point.	1¾ Point.	2 Points.
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	0.9	0.9
2	2.0	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.8
3	3.0	3.0	3.0	3.0	2.9	2.9	2.9	2.8	2.8
4	4.0	4.0	4.0	4.0	3.9	3.9	3.8	3.8	3.7
5	5.0	5.0	5.0	4.9	4.9	4.9	4.8	4.7	4.6
6	6.0	6.0	6.0	5.9	5.9	5.8	5.7	5.6	5.5
7	7.0	7.0	7.0	6.9	6.9	6.8	6.7	6.6	6.5
8	8.0	8.0	8.0	7.9	7.8	7.8	7.7	7.5	7.4
9	9.0	9.0	9.0	8.9	8.8	8.7	8.6	8.5	8.3
10	10.0	10.0	10.0	9.9	9.8	9.7	9.6	9.4	9.2
20	20.0	20.0	19.9	19.8	19.6	19.4	19.1	18.8	18.5
30	30.0	30.0	29.9	29.7	29.4	29.1	28.7	28.2	27.7
40	40.0	40.0	39.8	39.6	39.2	38.8	38.3	37.7	37.0
50	50.0	49.9	49.8	49.5	49.0	48.5	47.8	47.1	46.2
60	60.0	59.9	59.7	59.4	58.8	58.2	57.4	56.5	55.4
70	70.0	69.9	69.7	69.2	68.7	67.9	67.0	65.9	64.7
80	80.0	79.9	79.6	79.1	78.5	77.6	76.6	75.3	73.9
90	90.0	89.9	89.6	89.0	88.3	87.3	86.1	84.7	83.1
100	100.0	99.9	99.5	98.9	98.1	97.0	95.7	94.2	92.4
110	110.0	109.9	109.5	108.8	107.9	106.7	105.3	103.6	101.6
120	120.0	119.9	119.4	118.7	117.7	116.4	114.8	113.0	110.9
130	130.0	129.8	129.4	128.6	127.5	126.1	124.4	122.4	120.1
140	140.0	139.8	139.3	138.5	137.3	135.8	134.0	131.8	129.3
150	150.0	149.8	149.3	148.4	147.1	145.5	143.5	141.2	138.6
160	160.0	159.8	159.2	158.3	156.9	155.2	153.1	150.6	147.8
170	170.0	169.8	169.2	168.2	166.7	164.9	162.7	160.1	157.1
180	180.0	179.8	179.1	178.1	176.5	174.6	172.2	169.5	166.3
190	190.0	189.8	189.1	187.9	186.3	184.3	181.8	178.9	175.5
200	200 0	199.8	199.0	197.8	196.2	194.0	191.4	188.3	184.8
210	210.0	209.8	209.0	207.7	206.0	203.7	201.0	197.7	194.0
220	220.0	219.7	218.9	217.6	215.8	213.4	210.5	207.1	203.3
230	230.0	229.7	228.9	227.5	225.6	223.1	220.1	216.6	212.5
240	240.0	239.7	238.8	237.4	235.4	232.8	229.7	226.0	221.7
250	250.0	249.7	248.8	247.3	245.2	242.5	239.2	235.4	231.0
260	260.0	259.7	258.7	257.2	255.0	252.2	248.8	244.8	240.2
270	270.0	269.7	268.7	267.1	264.8	261.9	258.4	254.2	249.4
280	280.0	279.7	278.7	277.0	274.6	271.6	267.9	263.6	258.7
290	290.0	289.7	288.6	286.9	284.4	281.3	277.5	273.0	267.9
300	300.0	299.6	298.6	296.8	294.2	291.0	287.1	282.5	277.2
Dist.	8 Points.	7¾ Points.	7½ Points.	7¼ Points.	7 Points.	6¾ Points.	6½ Points.	6¼ Points.	6 Points.

Angle of the Course.

Departure.

DEPARTURE.

Dist.	Angle of the Course.								
	0 Point.	¼ Point.	½ Point	¾ Point.	1 Point.	1¼ Point.	1½ Point.	1¾ Point.	2 Points.
1	.0	0.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4
2	.0	0.1	0.2	0.3	0 4	0.5	0.6	0.7	0.8
3	.0	0.1	0.3	0.4	0.6	0.7	0.9	1.0	1.1
4	.0	0.2	0.4	0.6	0.8	1.0	1.2	1.3	1.5
5	.0	0.2	0.5	0.7	1.0	1.2	1.5	1.7	1.9
6	.0	0.3	0.6	0.9	1.2	1.5	1.7	2.0	2.3
7	.0	0.3	0.7	1.0	1.4	1.7	2.0	2.4	2.7
8	.0	0.4	0.8	1.2	1.6	1.9	2.3	2.7	3.1
9	.0	0.4	0.9	1.3	1.8	2.2	2.6	3.0	3.4
10	.0	0.5	1.0	1.5	2.0	2.4	2.9	3.4	3.8
20	.0	1.0	2.0	2.9	3.9	4.9	5.8	6.7	7.7
30	.0	1.5	2.9	4.4	5.9	7.3	8.7	10.1	11.5
40	.0	2.0	3.9	5.9	7.8	9.7	11.6	13.5	15.3
50	.0	2.5	4.9	7.3	9.8	12.2	14.5	16.8	19.1
60	.0	2.9	5.9	8.8	11.7	14.6	17.4	20.2	23.0
70	.0	3.4	6.9	10.3	13.7	17.0	20.3	23.6	26.8
80	.0	3.9	7.8	11.7	15.6	19.4	23.2	26.9	30.6
90	.0	4.4	8.8	13.2	17.6	21.9	26.1	30.3	34.4
100	.0	4.9	9.8	14.7	19.5	24.3	29.0	33.7	38.3
110	.0	5.4	10.8	16.1	21.5	26.7	31.9	37.1	42.1
120	.0	5.9	11.8	17.6	23.4	29.2	34.8	40.4	45.9
130	.0	6.4	12.7	19.1	25.4	31.6	37.7	43.8	49.8
140	.0	6.9	13.7	20.5	27.3	34.0	40.6	47.2	53.6
150	.0	7.4	14.7	22.0	29.3	36.5	43.5	50.5	57.4
160	.0	7.9	15.7	23.5	31.2	38.9	46.4	53.9	61.2
170	.0	8.3	16.7	24.9	33.2	41.3	49.3	57.3	65.1
180	.0	8.8	17.6	26.4	35.1	43.7	52.2	60.6	68.9
190	.0	9.3	18.6	27.9	37.1	46.2	55.1	64.0	72.7
200	.0	9.8	19.6	29.3	39.0	48.6	58.1	67.4	76.5
210	.0	10.3	20.6	30.8	41.0	51.0	61.0	70.7	80.4
220	.0	10.8	21.6	32.3	42.9	53.5	63.9	74.1	84.2
230	.0	11.3	22.5	33.7	44.9	55.9	66.8	77.5	88.0
240	.0	11.8	23.5	35.2	46.8	58.3	69.7	80.8	91.8
250	.0	12.3	24.5	36.7	48.8	60.7	72.6	84.2	95.7
260	.0	12.8	25.5	38.1	50.7	63.2	75 5	87.6	99.5
270	.0	13.3	26.5	39.6	52.7	65.6	78.4	91.0	103.3
280	.0	13.7	27.4	41.1	54.6	68.0	81.3	94.3	107.2
290	.0	14.2	28.4	42.5	56.6	70.5	84.2	97.7	111.0
300	.0	14.7	29.4	44.0	58.5	72.9	87.1	101.1	114.8
	8 Points.	7¾ Points.	7½ Points.	7¼ Points.	7 Points.	6¾ Points.	6½ Points.	6¼ Points.	6 Points.
Dist.	Angle of the Course.								

DIFFERENCE OF LATITUDE.

TABLE XV. *a.*

Difference of Latitude

Dist.	Angle of the Course.								
	2 Points.	2¼ Points.	2½ Points.	2¾ Points.	3 Points.	3¼ Points.	3½ Points.	3¾ Points.	4 Points.
1	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.7	0.7
2	1.8	1.8	1.8	1.7	1.7	1.6	1.5	1.5	1.4
3	2.8	2.7	2.6	2.6	2.5	2.4	2.3	2.2	2.1
4	3.7	3.6	3.5	3.4	3.3	3.2	3.1	3.0	2.8
5	4.6	4.5	4.4	4.3	4.2	4.0	3.9	3.7	3.5
6	5.5	5.4	5.3	5.1	5.0	4.8	4.6	4.4	4.2
7	6.5	6.3	6.2	6.0	5.8	5.6	5.4	5.2	4.9
8	7.4	7.2	7.1	6.9	6.7	6.4	6.2	5.9	5.7
9	8.3	8.1	7.9	7.7	7.5	7.2	7.0	6.7	6.4
10	9.2	9.0	8.8	8.6	8.3	8.0	7.7	7.4	7.1
20	18.5	18.1	17.6	17.2	16.6	16.1	15.5	14.8	14.1
30	27.7	27.1	26.5	25.7	24.9	24.1	23.2	22.2	21.2
40	37.0	36.2	35.3	34.3	33.3	32.1	30.9	29.6	28.3
50	46.2	45.2	44.1	42.9	41.6	40.2	38.6	37.0	35.4
60	55.4	54.2	52.9	51.5	49.9	48.2	46.4	44.5	42.4
70	64.7	63.3	61.7	60.0	58.2	56.2	54.1	51.9	49.5
80	73.9	72.3	70.6	68.6	66.5	64.3	61.8	59.3	56.6
90	83.2	81.4	79.4	77.2	74.8	72.3	69.6	66.7	63.6
100	92.4	90.4	88.2	85.8	83.1	80.3	77.3	74.1	70.7
110	101.6	99.4	97.0	94.3	91.5	88.4	85.0	81.5	77.8
120	110.9	108.5	105.8	102.9	99.8	96.4	92.8	88.9	84.8
130	120.1	117.5	114.7	111.5	108.1	104.4	100.5	96.3	91.9
140	129.3	126.6	123.5	120.1	116.4	112.4	108.2	103.7	99.0
150	138.6	135.6	132.3	128.7	124.7	120.5	115.9	111.1	106.1
160	147.8	144.6	141.1	137.2	133.0	128.5	123.7	118.5	113.1
170	157.1	153.7	149.9	145.8	141.3	136.5	131.4	126.0	120.2
180	166.3	162.7	158.8	154.4	149.7	144.6	139.1	133.4	127.3
190	175.5	171.8	167.6	163.0	158.0	152.6	146.9	140.8	134.3
200	184.8	180.8	176.4	171.5	166.3	160.6	154.6	148.2	141.4
210	194.0	189.8	185.2	180.1	174.6	168.7	162.3	155.6	148.5
220	203.3	198.9	194.0	188.7	182.9	176.7	170.1	163.0	155.6
230	212.5	207.9	202.8	197.3	191.2	184.7	177.8	170.4	162.6
240	221.7	217.0	211.7	205.9	199.5	192.8	185.5	177.8	169.7
250	231.0	226.0	220.5	214 4	207.9	200.8	193.2	185.2	176.8
260	240.2	235.0	229.3	223.0	216.2	208.8	201.0	192.6	183.8
270	249.5	244.1	238.1	231.6	224.5	216.9	208.7	200.1	190.9
280	258.7	253.1	246.9	240.2	232.8	224.9	216.4	207.5	198.0
290	267.9	262.2	255.8	248.7	241.1	232.9	224.2	214.9	205.1
300	277.2	271.2	264.6	257.3	249.4	241.0	231.9	222.3	212.1
Dist.	6 Points.	5¼ Points.	5½ Points.	5¾ Points.	5 Points.	4¾ Points.	4½ Points.	4¼ Points.	4 Points.
	Angle of the Course.								

Departure.

DEPARTURE.

Dist.	Angle of the Course.								
	2 Points.	2¼ Points.	2½ Points.	2¾ Points.	3 Points.	3¼ Points.	3½ Points.	3¾ Points.	4 Points.
1	0.4	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.7
2	0.8	0.9	0.9	1.0	1.1	1.2	1.3	1.3	1.4
3	1.1	1.3	1.4	1.5	1.7	1.8	1.9	2.0	2.1
4	1.5	1.7	1.9	2.1	2.2	2.4	2.5	2.7	2.8
5	1.9	2.1	2.4	2.6	2.8	3.0	3.2	3.4	3.5
6	2.3	2.6	2.8	3.1	3.3	3.6	3.8	4.0	4.2
7	2.7	3.0	3.3	3.6	3.9	4.2	4.4	4.7	4.9
8	3.1	3.4	3.8	4.1	4.4	4.8	5.1	5.4	5.7
9	3.4	3.8	4.2	4.6	5.0	5.4	5.7	6.0	6.4
10	3.8	4.3	4.7	5.1	5.6	6.0	6.3	6.7	7.1
20	7.7	8.6	9.4	10.3	11.1	11.9	12.7	13.4	14.1
30	11.5	12.8	14.1	15.4	16.7	17.9	19.0	20.1	21.2
40	15.3	17.1	18.9	20.6	22.2	23.8	25.4	26.9	28.3
50	19.1	21.4	23.6	25.7	27.8	29.8	31.7	33.6	35.4
60	23.0	25.7	28.3	30.8	33.3	35.7	38.1	40.3	42.4
70	26.8	29.9	33.0	36.0	38.9	41.7	44.4	47.0	49.5
80	30.6	34.2	37.7	41.1	44.4	47.7	50.7	53.7	56.6
90	34.4	38.5	42.4	46.3	50.0	53.6	57.1	60.4	63.6
100	38.3	42.8	47.1	51.5	55.6	59.6	63.4	67.2	70.7
110	42.1	47.0	51.8	56.5	61.1	65.5	69.8	73.9	77.8
120	45.9	51.3	56.6	61.7	66.7	71.5	76.1	80.6	84.8
130	49.8	55.6	61.3	66.8	72.2	77.4	82.5	87.3	91.9
140	53.6	59.9	66.0	72.0	77.8	83.4	88.8	94.0	99.0
150	57.4	64.1	70.7	77.1	83.3	89.4	95.2	100.7	106.1
160	61.2	68.4	75.4	82.3	88.9	95.3	101.5	107.4	113.1
170	65.1	72.7	80.1	87.4	94.4	101.3	107.8	114.2	120.2
180	68.9	77.0	84.8	92.5	100.0	107.2	114.2	120.9	127.3
190	72.7	81.2	89.6	97.7	105.6	113.2	120.5	127.6	134.3
200	76.5	85.5	94.3	102.8	111.1	119.1	126.9	134.3	141.4
210	80.4	89.8	99.0	108.0	116.7	125.1	133.2	141.0	148.5
220	84.2	94.1	103.7	113.1	122.2	131.1	139.6	147.7	155.6
230	88.0	98.3	108.4	118.2	127.8	137.0	145.9	154.5	162.6
240	91.8	102.6	113.1	123.4	133.3	143.0	152.3	161.2	169.7
250	95.7	106.9	217.8	128.5	138.9	148.9	158.6	167.9	176.8
260	99.5	111.2	122.6	133.7	144.4	154.9	164.9	174.6	183.8
270	103.3	115.4	127.3	138.8	150.0	160.8	171.3	181.3	190.9
280	107.2	119.7	132.0	143.9	155.6	166.8	177.6	188.0	198.0
290	111.0	124.0	136.7	149.1	161.1	172.8	184.0	194.7	205.1
300	114.8	128.3	141.4	154.2	166.7	178.7	190.3	201.5	212.1
	6 Points.	5¾ Points.	5½ Points.	5¼ Points.	5 Points.	4¾ Points.	4½ Points.	4¼ Points.	4 Points.
Dist.	Angle of the Course.								

DIFFERENCE OF LATITUDE.

TABLE XV. *b*.

Difference of Latitude.

Dist.	Angle of the Course.									
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°
1	1.0	1.0	1.0	1.0	1.0	1.0	1·0	1.0	1.0	1.0
2	2.0	2.0	2.0	2.0	2.0	2.0	2·0	2.0	2.0	2.0
3	3.0	3.0	3.0	3.0	3.0	3.0	3·0	3.0	3.0	3.0
4	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
5	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	4.9
6	6.0	6.0	6.0	6.0	6.0	6.0	6.0	6.0	5.9	5.9
7	7.0	7.0	7.0	7.0	7.0	7.0	7.0	6.9	6.9	6.9
8	8.0	8.0	8.0	8.0	8.0	8.0	8.0	7.9	7.9	7.9
9	9.0	9.0	9.0	9.0	9.0	9.0	9.0	8.9	8.9	8.9
10	10.0	10.0	10.0	10.0	10.0	10.0	9.9	9.9	9.9	9.9
20	20.0	20.0	20.0	20.0	20.0	19.9	19.9	19.9	19.8	19.8
30	30.0	30.0	30.0	30.0	29.9	29.9	29.8	29.8	29.7	29.6
40	40.0	40.0	40.0	39.9	39.9	39.8	39.8	39.7	39.6	39.5
50	50.0	50.0	50.0	49.9	49.9	49.8	49.7	49.6	49.5	49.4
60	60.0	60.0	60.0	59.9	59.9	59.8	59.7	59.6	59.4	59.3
70	70.0	70.0	70.0	69.9	69.8	69.7	69.6	69.5	69.3	69.1
80	80.0	80.0	80.0	79.9	79.8	79.7	79.6	79.4	79.2	79.0
90	90.0	90.0	89.9	89.9	89.8	89.7	89.5	89.3	89.1	88.9
100	100.0	100.0	99.9	99.9	99.8	99.6	99.5	99.3	99.0	98.8
110	110.0	110.0	109.9	109.8	109.7	109.6	109.4	109.2	108.9	108.6
120	120.0	120.0	119.9	119.8	119.7	119.5	119.3	119.1	118.8	118.5
130	130.0	130.0	129.9	129.8	129.7	129.5	129.3	129.0	128.7	128.4
140	140.0	140.0	139.9	139.8	139.7	139.5	139.2	139.0	138.6	138.3
150	150.0	150.0	149.9	149.8	149.6	149.4	149.2	148.9	148.5	148.2
160	160.0	160.0	159.9	159.8	159.6	159.4	159.1	158.8	158.4	158.0
170	170.0	170.0	169.9	169.8	169.6	169.4	169.1	168.7	168.3	167.9
180	180.0	180.0	179.9	179.8	179.6	179.3	179.0	178.7	178.2	177.8
190	190.0	190.0	189.9	189.7	189.5	189.3	189.0	188.6	188.2	187.7
200	200.0	200.0	199.9	199.7	199.5	199.2	198.9	198.5	198.1	197.5
210	210.0	210.0	209.9	209.7	209.5	209.2	208.8	208.4	208.0	207.4
220	220.0	220.0	219.9	219.7	219.5	219.2	218.8	218.4	217.9	217.3
230	230.0	230.0	229.9	229.7	229.4	229.1	228.7	228.3	227.8	227.2
240	240.0	240.0	239.9	239.7	239.4	239.1	238.7	238.2	237.7	237.0
250	250.0	250.0	249.8	249.7	249.4	249.0	248.6	248.1	247.6	246.9
260	260.0	260.0	259.8	259.6	259.4	259.0	258.6	258.1	257.5	256.8
270	270.0	270.0	269.8	269.6	269.3	269.0	268.5	268.0	267.4	266.7
280	280.0	280.0	279.8	279.6	279.3	278.9	278.5	277.9	277.3	276.6
290	290.0	290.0	289.8	289.6	289.3	288.9	288.4	287.8	287.2	286.4
300	300.0	300.0	299.8	299.6	299.3	298.9	298.4	297.8	297.1	296.3
	90°	89°	88°	87°	86°	85°	84°	83°	82°	81°
Dist.	Angle of the Course.									

Departure.

Departure.

Dist.	Angle of the Course.									
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°
1	.0	0.0	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.2
2	.0	0.0	0.1	0.1	0.1	0.2	0.2	0.2	0.3	0.3
3	.0	0.1	0.1	0.2	0.2	0.3	0.3	0.4	0.4	0.5
4	.0	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.6
5	.0	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8
6	.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
7	.0	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1
8	.0	0.1	0.3	0.4	0.6	0.7	0.8	1.0	1.1	1.3
9	.0	0.2	0.3	0.5	0.6	0.8	0.9	1.1	1.3	1.4
10	.0	0.2	0.3	0.5	0.7	0.9	1.0	1.2	1.4	1.6
20	.0	0.3	0.7	1.0	1.4	1.7	2.1	2.4	2.8	3.1
30	.0	0.5	1.0	1.6	2.1	2.6	3.1	3.7	4.2	4.7
40	.0	0.7	1.4	2.1	2.8	3.5	4.2	4.9	5.6	6.3
50	.0	0.9	1.7	2.6	3.5	4.4	5.2	6.1	7.0	7.8
60	.0	1.0	2.1	3.1	4.2	5.2	6.3	7.3	8.4	9.4
70	.0	1.2	2.4	3.7	4.9	6.1	7.3	8.5	9.7	11.0
80	.0	1.4	2.8	4.2	5.6	7.0	8.4	9.7	11.1	12.5
90	.0	1.6	3.1	4.7	6.3	7.8	9.4	11.0	12.5	14.1
100	.0	1.7	3.5	5.2	7.0	8.7	10.5	12.2	13.9	15.6
110	.0	1.9	3.8	5.8	7.7	9.6	11.5	13.4	15.3	17.2
120	.0	2.1	4.2	6.3	8.4	10.5	12.5	14.6	16.7	18.8
130	.0	2.3	4.5	6.8	9.1	11.3	13.6	15.8	18.1	20.3
140	.0	2.4	4.9	7.3	9.8	12.2	14.6	17.1	19.5	21.9
150	.0	2.6	5.2	7.9	10.5	13.1	15.7	18.3	20.9	23.5
160	.0	2.8	5.6	8.4	11.2	13.9	16.7	19.5	22.3	25.0
170	.0	3.0	5.9	8.9	11.9	14.8	17.8	20.7	23.7	26.6
180	.0	3.1	6.3	9.4	12.6	15.7	18.8	21.9	25.1	28.2
190	.0	3.3	6.6	9.9	13.3	16.6	19.9	23.2	26.4	29.7
200	.0	3.5	7.0	10.5	14.0	17.4	20.9	24.4	27.8	31.3
210	.0	3.7	7.3	11.0	14.6	18.3	22.0	25.6	29.2	32.9
220	.0	3.8	7.7	11.5	15.3	19.2	23.0	26.8	30.6	34.4
230	.0	4.0	8.0	12.0	16.0	20.0	24.0	28.0	32.0	36.0
240	.0	4.2	8.4	12.6	16.7	20.9	25.1	29.2	33.4	37.5
250	.0	4·4	8.7	13.1	17.4	21.8	26.1	30.5	34.8	39.1
260	.0	4.5	9.1	13.6	18.1	22.7	27.2	31.7	36.2	40.7
270	.0	4.7	9.4	14.1	18.8	23.5	28.2	32.9	37.6	42.2
280	.0	4.9	9.8	14.7	19.5	24.4	29.3	34.1	39.0	43.8
290	.0	5.1	10.1	15.2	20.2	25.3	30.3	35.3	40.4	45.4
300	.0	5.2	10.5	15.7	20.9	26.1	31.4	36.6	41.8	46.9
	90°	89°	88°	87°	86°	85°	84°	83°	82°	81°
Dist.	Angle of the Course.									

Difference of Latitude.

TABLE XV. *b*.

Difference of Latitude.

Dist.	Angle of the Course.									
	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°
1	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2	2.0	2.0	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9
3	3.0	3.0	2.9	2.9	2.9	2.9	2.9	2.9	2.9	2.9
4	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.8	3.8	3.8
5	4.9	4.9	4.9	4.9	4.9	4.9	4.8	4.8	4.8	4.8
6	5.9	5.9	5.9	5.9	5.8	5.8	5.8	5.8	5.7	5.7
7	6.9	6.9	6.9	6.8	6.8	6.8	6.8	6.7	6.7	6.7
8	7.9	7.9	7.9	7.8	7.8	7.8	7.7	7.7	7.7	7.6
9	8.9	8.9	8.8	8.8	8.8	8.7	8.7	8.7	8.6	8.6
10	9.9	9.8	9.8	9.8	9.7	9.7	9.7	9.6	9.6	9.5
20	19.8	19.7	19.6	19.6	19.5	19.4	19.3	19.2	19.1	19.0
30	29.6	29.5	29.4	29.3	29.2	29.1	29.0	28.8	28.7	28.5
40	39.5	39.4	39.3	39.1	39.0	38.8	38.6	38.5	38.3	38.0
50	49.4	49.2	49.1	48.9	48.7	48.5	48.3	48.1	47.8	47.6
60	59.3	59.1	58.9	58.7	58.5	58.2	58.0	57.7	57.4	57.1
70	69.1	68.9	68.7	68.5	68.2	67.9	67.6	67.3	66.9	66.6
80	79.0	78.8	78.5	78.3	77.9	77.6	77.3	76.9	76.5	76.1
90	88.9	88.6	88.3	88.0	87.7	87.3	86.9	86.5	86.1	85.6
100	98.8	98.5	98.2	97.8	97.4	97.0	96.6	96.1	95.6	95.1
110	108.6	108.3	108.0	107.6	107.2	106.7	106.3	105.7	105.2	104.6
120	118.5	118.2	117.8	117.4	116.9	116.4	115.9	115.4	114.8	114.1
130	128.4	128.0	127.6	127.2	126.7	126.1	125.6	125.0	124.3	123.6
140	138.3	137.9	137.4	136.9	136.4	135.8	135.2	134.6	133.9	133.1
150	148.2	147.7	147.2	146.7	146.2	145.5	144.9	144.2	143.4	142.7
160	158.0	157.6	157.1	156.5	155.9	155.2	154.5	153.8	153.0	152.2
170	167.9	167.4	166.9	166.3	165.6	165.0	164.2	163.4	162.6	161.7
180	177.8	177.3	176.7	176.1	175.4	174.7	173.9	173.0	172.1	171.2
190	187.7	187.1	186.5	185.8	185.1	184.4	183.5	182.6	181.7	180.7
200	197.5	197.0	196.3	195.6	194.9	194.1	193.2	192.3	191.3	190.2
210	207.4	206.8	206.1	205.4	204.6	203.8	202.8	201.9	200.8	199.7
220	217.3	216.7	216.0	215.2	214.4	213.5	212.5	211.5	210.4	209.2
230	227.2	226.5	225.8	225.0	224.1	223.2	222.2	221.1	220.0	218.7
240	237.0	236.4	235.6	234.8	233.8	232.9	231.8	230.7	229.5	228.3
250	246.9	246.2	245.4	244.5	243.6	242.6	241.5	240.3	239.1	237.8
260	256.8	256.1	255.2	254.3	253.3	252.3	251.1	249.9	248.6	247.3
270	266.7	265.9	265.0	264.1	263.1	262.0	260.8	259.5	258.2	256.8
280	276.6	275.7	274.9	273.9	272.8	271.7	270.5	269.2	267.8	266.3
290	286.4	285.6	284.7	283.7	282.6	281.4	280.1	278.8	277.3	275.8
300	296.3	295.4	294.5	293.4	292.3	291.1	289.8	288.4	286.9	285.3
	81°	80°	79°	78°	77°	76°	75°	74°	73°	72°
Dist	Angle of the Course.									

Departure.

DEPARTURE.

Dist.	Angle of the Course.									
	9°	10°	11°	12°	13°	14°	15°	16°	17°	18°
1	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
2	0.3	0.3	0.4	0.4	0.4	0.5	0.5	0.6	0.6	0.6
3	0.5	0.5	0.6	0.6	0.7	0.7	0.8	0.8	0.9	0.9
4	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.2	1.2
5	0.8	0.9	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.5
6	0.9	1.0	1.1	1.2	1.3	1.5	1.6	1.7	1.8	1.9
7	1.1	1.2	1.3	1.5	1.6	1.7	1.8	1.9	2.0	2.2
8	1.3	1.4	1.5	1.7	1.8	1.9	2.1	2.2	2.3	2.5
9	1.4	1.6	1.7	1.9	2.0	2.2	2.3	2.5	2.6	2.8
10	1.6	1.7	1.9	2.1	2.2	2.4	2.6	2.8	2.9	3.1
20	3.1	3.5	3.8	4.2	4.5	4.8	5.2	5.5	5.8	6.2
30	4.7	5.2	5.7	6.2	6.7	7.3	7.8	8.3	8.8	9.3
40	6.3	6.9	7.6	8.3	9.0	9.7	10.4	11.0	11.7	12.4
50	7.8	8.7	9.5	10.4	11.2	12.1	12.9	13.8	14.6	15.5
60	9.4	10.4	11.4	12.5	13.5	14.5	15.5	16.5	17.5	18.5
70	11.0	12.2	13.4	14.6	15.7	16.9	18.1	19.3	20.5	21.6
80	12.5	13.9	15.3	16.6	18.0	19.4	20.7	22.1	23.4	24.7
90	14.1	15.6	17.2	18.7	20.2	21.8	23.3	24.8	26.3	27.8
100	15.6	17.4	19.1	20.8	22.5	24.2	25.9	27.6	29.2	30.9
110	17.2	19.1	21.0	22.9	24.7	26.6	28.5	30.3	32.2	34.0
120	18.8	20.8	22.9	24.9	27.0	29.0	31.1	33.1	35.1	37.1
130	20.3	22.6	24.8	27.0	29.2	31.4	33.6	35.8	38.0	40.2
140	21.9	24.3	26.7	29.1	31.5	33.9	36.2	38.6	40.9	43.3
150	23.5	26.0	28.6	31.2	33.7	36.3	38.8	41.3	43.9	46.4
160	25.0	27.8	30.5	33.3	36.0	38.7	41.4	44.1	46.8	49.4
170	26.6	29.5	32.4	35.3	38.2	41.1	44.0	46.9	49.7	52.5
180	28.2	31.3	34.3	37.4	40.5	43.5	46.6	49.6	52.6	55.6
190	29.7	33.0	36.3	39.5	42.7	46.0	49.2	52.4	55.6	58.7
200	31.3	34.7	38.2	41.6	45.0	48.4	51.8	55.1	58.5	61.8
210	32.9	36.5	40.1	43.7	47.2	50.8	54.4	57.9	61.4	64.9
220	34.4	38.2	42.0	45.7	49.5	53.2	56.9	60.6	64.3	68.0
230	36.0	39.9	43.9	47.8	51.7	55.6	59.5	63.4	67.2	71.1
240	37.5	41.7	45.8	49.9	54.0	58.1	62.1	66.2	70.2	74.2
250	39.1	43.4	47.7	52.0	56.2	60.5	64.7	68.9	73.1	77.3
260	40.7	45.1	49.6	54.1	58.5	62.9	67.3	71.7	76.0	80.3
270	42.2	46.9	51.5	56.1	60.7	65.3	69.9	74.4	78.9	83.4
280	43.8	48.6	53.4	58.2	63.0	67.7	72.5	77.2	81.9	86.5
290	45.4	50.4	55.3	60.3	65.2	70.2	75.1	79.9	84.8	89.6
300	46.9	52.1	57.2	62.4	67.5	72.6	77.6	82.7	87.7	92.7
	81°	80°	79°	78°	77°	76°	75°	74°	73°	72°
Dist.	Angle of the Course.									

DIFFERENCE OF LATITUDE.

TABLE XV. *b*.

Difference of Latitude.

Dist.	Angle of the Course.									
	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°
1	1.0	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9
2	1.9	1.9	1.9	1.9	1.9	1.8	1.8	1.8	1.8	1.8
3	2.9	2.8	2.8	2.8	2.8	2.8	2.7	2.7	2.7	2.7
4	3.8	3.8	3.8	3.7	3.7	3.7	3.7	3.6	3.6	3.6
5	4.8	4.7	4.7	4.7	4.6	4.6	4.6	4.5	4.5	4.5
6	5.7	5.7	5.6	5.6	5.6	5.5	5.5	5.4	5.4	5.3
7	6.7	6.6	6.6	6.5	6.5	6.4	6.4	6.3	6.3	6.2
8	7.6	7.6	7.5	7.5	7.4	7.4	7.3	7.3	7.2	7.1
9	8.6	8.5	8.5	8.4	8.3	8.3	8.2	8.2	8.1	8.0
10	9.5	9.5	9.4	9.3	9.3	9.2	9.1	9.1	9.0	8.9
20	19.0	18.9	18.8	18.7	18.5	18.4	18.3	18.1	18.0	17.8
30	28.5	28.4	28.2	28.0	27.8	27.6	27.4	27.2	27.0	26.7
40	38.0	37.8	37.6	37.3	37.1	36.8	36.5	36.3	36.0	35.6
50	47.6	47.3	47.0	46.7	46.4	46.0	45.7	45.3	44.9	44.6
60	57.1	56.7	56.4	56.0	55.6	55.2	54.8	54.4	53.9	53.5
70	66.6	66.2	65.8	65.4	64.9	64.4	63.9	63.4	62.9	62.4
80	76.1	75.6	75.2	74.7	74.2	73.6	73.1	72.5	71.9	71.3
90	85.6	85.1	84.6	84.0	83.4	82.8	82.2	81.6	80.9	80.2
100	95.1	94.6	94.0	93.4	92.7	92.1	91.4	90.6	89.9	89.1
110	104.6	104.0	103.4	102.7	102.0	101.3	100.5	99.7	98.9	98.0
120	114.1	113.5	112.8	112.0	111.3	110.5	109.6	108.8	107.9	106.9
130	123.6	122.9	122.2	121.4	120.5	119.7	118.8	117.8	116.8	115.8
140	133.1	132.4	131.6	130.7	129.8	128.9	127.9	126.9	125.8	124.7
150	142.7	141.8	141.0	140.0	139.1	138.1	137.0	135.9	134.8	133.7
160	152.2	151.3	150.4	149.4	148.3	147.3	146.2	145.0	143.8	142.6
170	161.7	160.7	159.7	158.7	157.6	156.5	155.3	154.1	152.8	151.5
180	171.2	170.2	169.1	168.0	166.9	165.7	164.4	163.1	161.8	160.4
190	180.7	179.6	178.5	177.4	176.2	174.9	173.6	172.2	170.8	169.3
200	190.2	189.1	187.9	186.7	185.4	184.1	182.7	181.3	179.8	178.2
210	199.7	198.6	197.3	196.1	194.7	193.3	191.8	190.3	188.7	187.1
220	209.2	208.0	206.7	205.4	204.0	202.5	201.0	199.4	197.7	196.0
230	218.7	217.5	216.1	214.7	213.3	211.7	210.1	208.5	206.7	204.9
240	228.3	226.9	225.5	224.1	222.5	220.9	219.3	217.5	215.7	213.8
250	237.8	236.4	234.9	233.4	231.8	230.1	228.4	226.6	224.7	222.8
260	247.3	245.8	244.3	242.7	241.1	239.3	237.5	235.6	233.7	231.7
270	256.8	255.3	253.7	252.1	250.3	248.5	246.7	244.7	242.7	240.6
280	266.3	264.7	263.1	261.4	259.6	257.7	255.8	253.8	251.7	249.5
290	275.8	274.2	272.5	270.7	268.9	266.9	264.9	262.8	260.7	258.4
300	285.3	283.7	281.9	280.1	278.2	276.2	274.1	271.9	269.6	267.3
	72°	71°	70°	69°	68°	67°	66°	65°	64°	63°
Dist.	Angle of the Course.									

Departure.

DEPARTURE.

Dist.	Angle of the Course.									
	18°	19°	20°	21°	22°	23°	24°	25°	26°	27°
1	0.3	0.3	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.5
2	0.6	0.7	0.7	0.7	0.7	0.8	0.8	0.8	0.9	0.9
3	0.9	1.0	1.0	1.1	1.1	1.2	1.2	1.3	1.3	1.4
4	1.2	1.3	1.4	1.4	1.5	1.6	1.6	1.7	1.8	1.8
5	1.5	1.6	1.7	1.8	1.9	2.0	2.0	2.1	2.2	2.3
6	1.9	2.0	2.1	2.2	2.2	2.3	2.4	2.5	2.6	2.7
7	2.2	2.3	2.4	2.5	2.6	2.7	2.8	3.0	3.1	3.2
8	2.5	2.6	2.7	2.9	3.0	3.1	3.3	3.4	3.5	3.6
9	2.8	2.9	3.1	3.2	3.4	3.5	3.7	3.8	3.9	4.1
10	3.1	3.3	3.4	3.6	3.7	3.9	4.1	4.2	4.4	4.5
20	6.2	6.5	6.8	7.2	7.5	7.8	8.1	8.5	8.8	9.1
30	9.3	9.8	10.3	10.8	11.2	11.7	12.2	12.7	13.2	13.6
40	12.4	13.0	13.7	14.3	15.0	15.6	16.3	16.9	17.5	18.2
50	15.5	16.3	17.1	17.9	18.7	19.5	20.3	21.1	21.9	22.7
60	18.5	19.5	20.5	21.5	22.5	23.4	24.4	25.4	26.3	27.2
70	21.6	22.8	23.9	25.1	26.2	27.4	28.5	29.6	30.7	31.8
80	24.7	26.0	27.4	28.7	30.0	31.3	32.5	33.8	35.1	36.3
90	27.8	29.3	30.8	32.3	33.7	35.2	36.6	38.0	39.5	40.9
100	30.9	32.6	34.2	35.8	37.5	39.1	40.7	42.3	43.8	45.4
110	34.0	35.8	37.6	39.4	41.2	43.0	44.7	46.5	48.2	49.9
120	37.1	39.1	41.0	43.0	45.0	46.9	48.8	50.7	52.6	54.5
130	40.2	42.3	44.5	46.6	48.7	50.8	52.9	54.9	57.0	59.0
140	43.3	45.6	47.9	50.2	52.4	54.7	56.9	59.2	61.4	63.6
150	46.4	48.8	51.3	53.8	56.2	58.6	61.0	63.4	65.8	68.1
160	49.4	52.1	54.7	57.3	59.9	62.5	65.1	67.6	70.1	72.6
170	52.5	55.3	58.1	60.9	63.7	66.4	69.1	71.8	74.5	77.2
180	55.6	58.6	61.6	64.5	67.4	70.3	73.2	76.1	78.9	81.7
190	58.7	61.9	65.0	68.1	71.2	74.2	77.3	80.3	83.3	86.3
200	61.8	65.1	68.4	71.7	74.9	78.1	81.3	84.5	87.7	90.8
210	64.9	68.4	71.8	75.3	78.7	82.1	85.4	88.7	92.1	95.3
220	68.0	71.6	75.2	78.8	82.4	86.0	89.5	93.0	96.4	99.9
230	71.1	74.9	78.7	82.4	86.2	89.9	93.5	97.2	100.8	104.4
240	74.2	78.1	82.1	86.0	89.9	93.8	97.6	101.4	105.2	109.0
250	77.3	81.4	85.5	89.6	93.7	97.7	101.7	105.7	109.6	113.5
260	80.3	84.6	88.9	93.2	97.4	101.6	105.8	109.9	114.0	118.0
270	83.4	87.9	92.3	96.8	101.1	105.5	109.8	114.1	118.4	122.6
280	86.5	91.2	95.8	100.3	104.9	109.4	113.9	118.3	122.7	127.1
290	89.6	94.4	99.2	103.9	108.6	113.3	118.0	122.6	127.1	131.7
300	92.7	97.7	102.6	107.5	112.4	117.2	122.0	126.8	131.5	136.2
	72°	71°	70°	69°	68°	67°	66°	65°	64°	63°
Dist.	Angle of the Course.									

DIFFERENCE OF LATITUDE.

TABLE XV. *b*.

Difference of Latitude.

Dist.	Angle of the Course.									
	27°	28°	29°	30°	31°	32°	33°	34°	35°	36°
1	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.8	0.8
2	1.8	1.8	1.7	1.7	1.7	1.7	1.7	1.7	1.6	1.6
3	2.7	2.6	2.6	2.6	2.6	2.5	2.5	2.5	2.5	2.4
4	3.6	3.5	3.5	3.5	3.4	3.4	3.4	3.3	3.3	3.2
5	4.5	4.4	4.4	4.3	4.3	4.2	4.2	4.1	4.1	4.0
6	5.3	5.3	5.2	5.2	5.1	5.1	5.0	5.0	4.9	4.9
7	6.2	6.2	6.1	6.1	6.0	5.9	5.9	5.8	5.7	5.7
8	7.1	7.1	7.0	6.9	6.9	6.8	6.7	6.6	6.6	6.5
9	8.0	7.9	7.9	7.8	7.7	7.6	7.5	7.5	7.4	7.3
10	8.9	8.8	8.7	8.7	8.6	8.5	8.4	8.3	8.2	8.1
20	17.8	17.7	17.5	17.3	17.1	17.0	16.8	16.6	16.4	16.2
30	26.7	26.5	26.2	26.0	25.7	25.4	25.2	24.9	24.6	24.3
40	35.6	35.3	35.0	34.6	34.3	33.9	33.5	33.2	32.8	32.4
50	44.6	44.1	43.7	43.3	42.9	42.4	41.9	41.5	41.0	40.5
60	53.5	53.0	52.5	52.0	51.4	50.9	50.3	49.7	49.1	48.5
70	62.4	61.8	61.2	60.6	60.0	59.4	58.7	58.0	57.3	56.6
80	71.3	70.6	70.0	69.3	68.6	67.8	67.1	66.3	65.5	64.7
90	80.2	79.5	78.7	77.9	77.1	76.3	75.5	74.6	73.7	72.8
100	89.1	88.3	87.5	86.6	85.7	84.8	83.9	82.9	81.9	80.9
110	98.0	97.1	96.2	95.3	94.3	93.3	92.3	91.2	90.1	89.0
120	106.9	106.0	105.0	103.9	102.9	101.8	100.6	99.5	98.3	97.1
130	115.8	114.8	113.7	112.6	111.4	110.2	109.0	107.8	106.5	105.2
140	124.7	123.6	122.4	121.2	120.0	118.7	117.4	116.1	114.7	113.3
150	133.7	132.4	131.2	129.9	128.6	127.2	125.8	124.4	122.9	121.4
160	142.6	141.3	139.9	138.6	137.1	135.7	134.2	132.6	131.1	129.4
170	151.5	150.1	148.7	147.2	145.7	144.2	142.6	140.9	139.3	137.5
180	160.4	158.9	157.4	155.9	154.3	152.6	151.0	149.2	147.4	145.6
190	169.3	167.8	166.2	164.5	162.9	161.1	159.3	157.5	155.6	153.7
200	178.2	176.6	174.9	173.2	171.4	169.6	167.7	165.8	163.8	161.8
210	187.1	185.4	183.7	181.9	180.0	178.1	176.1	174.1	172.0	169.9
220	196.0	194.2	192.4	190.5	188.6	186.6	184.5	182.4	180.2	178.0
230	204.9	203.1	201.2	199.2	197.1	195.1	192.9	190.7	188.4	186.1
240	213.8	211.9	209.9	207.8	205.7	203.5	201.3	199.0	196.6	194.2
250	222.8	220.7	218.7	216.5	214.3	212.0	209.7	207.3	204.8	202.3
260	231.7	229.6	227.4	225.2	222.9	220.5	218.1	215.5	213.0	210.3
270	240.6	238.4	236.1	233.8	231.4	229.0	226.4	223.8	221.2	218.4
280	249.5	247.2	244.9	242.5	240.0	237.5	234.8	232.1	229.4	226.5
290	258.4	256.1	253.6	251.1	248.6	245.9	243.2	240.4	237.6	234.6
300	267.3	264.9	262.4	259.8	257.1	254.4	251.6	248.7	245.7	242.7
	63°	62°	61°	60°	59°	58°	57°	56°	55°	54°
Dist.	Angle of the Course.									

Departure.

TABLE XV. *b*.

Departure.

Dist.	Angle of the Course.									
	27°	28°	29°	30°	31°	32°	33°	34°	35°	36°
1	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6
2	0.9	0.9	1.0	1.0	1.0	1.1	1.1	1.1	1.1	1.2
3	1.4	1.4	1.5	1.5	1.5	1.6	1.6	1.7	1.7	1.8
4	1.8	1.9	1.9	2.0	2.1	2.1	2.2	2.2	2.3	2.4
5	2.3	2.3	2.4	2.5	2.6	2.6	2.7	2.8	2.9	2.9
6	2.7	2.8	2.9	3.0	3.1	3.2	3.3	3.4	3.4	3.5
7	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	4.0	4.1
8	3.6	3.8	3.9	4.0	4.1	4.2	4.4	4.5	4.6	4.7
9	4.1	4.2	4.4	4.5	4.6	4.8	4.9	5.0	5.2	5.3
10	4.5	4.7	4.8	5.0	5.2	5.3	5.4	5.6	5.7	5.9
20	9.1	9.4	9.7	10.0	10.3	10.6	10.9	11.2	11.5	11.8
30	13.6	14.1	14.5	15.0	15.5	15.9	16.3	16.8	17.2	17.6
40	18.2	18.8	19.4	20.0	20.6	21.2	21.8	22.4	22.9	23.5
50	22.7	23.5	24.2	25.0	25.8	26.5	27.2	28.0	28.7	29.4
60	27.2	28.2	29.1	30.0	30.9	31.8	32.7	33.6	34.4	35.3
70	31.8	32.9	33.9	35.0	36.1	37.1	38.1	39.1	40.2	41.1
80	36.3	37.6	38.8	40.0	41.2	42.4	43.6	44.7	45.9	47.0
90	40.9	42.3	43.6	45.0	46.4	47.7	49.0	50.3	51.6	52.9
100	45.4	46.9	48.5	50.0	51.5	53.0	54.5	55.9	57.4	58.8
110	49.9	51.6	53.3	55.0	56.7	58.3	59.9	61.5	63.1	64.7
120	54.5	56.3	58.2	60.0	61.8	63.6	65.4	67.1	68.8	70.5
130	59.0	61.0	63.0	65.0	67.0	68.9	70.8	72.7	74.6	76.4
140	63.6	65.7	67.9	70.0	72.1	74.2	76.2	78.3	80.3	82.3
150	68.1	70.4	72.7	75.0	77.3	79.5	81.7	83.9	86.0	88.2
160	72.6	75.1	77.6	80.0	82.4	84.8	87.1	89.5	91.8	94.0
170	77.2	79.8	82.4	85.0	87.6	90.1	92.6	95.1	97.5	99.9
180	81.7	84.5	87.3	90.0	92.7	95.4	98.0	100.7	103.2	105.8
190	86.3	89.2	92.1	95.0	97.9	100.7	103.5	106.2	109.0	111.7
200	90.8	93.9	97.0	100.0	103.0	106.0	108.9	111.8	114.7	117.6
210	95.3	98.6	101.8	105.0	108.2	111.3	114.4	117.4	120.5	123.4
220	99.9	103.3	106.7	110.0	113.3	116.6	119.8	123.0	126.2	129.3
230	104.4	108.0	111.5	115.0	118.5	121.9	125.3	128.6	131.9	135.2
240	109.0	112.7	116.4	120.0	123.6	127.2	130.7	134.2	137.7	141.1
250	113.5	117.4	121.2	125.0	128.8	132.5	136.2	139.8	143.4	146.9
260	118.0	122.1	126.1	130.0	133.9	137.8	141.6	145.4	149.1	152.8
270	122.6	126.8	130.9	135.0	139.1	143.1	147.1	151.0	154.9	158.7
280	127.1	131.5	135.7	140.0	144.2	148.4	152.5	156.6	160.6	164.6
290	131.7	136.1	140.6	145.0	149.4	153.7	157.9	162.2	166.3	170.5
300	136.2	140.8	145.4	150.0	154.5	159.0	163.4	167.8	172.1	176.3
	63°	62°	61°	60°	59°	58°	57°	56°	55°	54°
Dist.	Angle of the Course.									

Difference of Latitude.

TABLE XV. *b.*

Difference of Latitude.

Dist.	Angle of the Course.									
	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°
1	0.8	0.8	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
2	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	1.4
3	2.4	2.4	2.4	2.3	2.3	2.3	2.2	2.2	2.2	2.1
4	3.2	3.2	3.2	3.1	3.1	3.0	3.0	2.9	2.9	2.8
5	4.0	4.0	3.9	3.9	3.8	3.8	3.7	3.7	3.6	3.5
6	4.9	4.8	4.7	4.7	4.6	4.5	4.5	4.4	4.3	4.2
7	5.7	5.6	5.5	5.4	5.4	5.3	5.2	5.1	5.0	4.9
8	6.5	6.4	6.3	6.2	6.1	6.0	5.9	5.9	5.8	5.7
9	7.3	7.2	7.1	7.0	6.9	6.8	6.7	6.6	6.5	6.4
10	8.1	8.0	7.9	7.8	7.7	7.5	7.4	7.3	7.2	7.1
20	16.2	16.0	15.8	15.5	15.3	15.1	14.9	14.6	14.4	14.1
30	24.3	24.0	23.6	23.3	23.0	22.6	22.3	21.9	21.6	21.2
40	32.4	31.9	31.5	31.1	30.6	30.2	29.7	29.3	28.8	28.3
50	40.5	39.9	39.4	38.9	38.3	37.7	37.2	36.6	36.0	35.4
60	48.5	47.9	47.3	46.6	46.0	45.3	44.6	43.9	43.2	42.4
70	56.6	55.9	55.2	54.4	53.6	52.8	52.0	51.2	50.4	49.5
80	64.7	63.9	63.0	62.2	61.3	60.4	59.5	58.5	57.5	56.6
90	72.8	71.9	70.9	69.9	68.9	67.9	66.9	65.8	64.7	63.6
100	80.9	79.9	78.8	77.7	76.6	75.5	74.3	73.1	71.9	70.7
110	89.0	87.8	86.7	85.5	84.3	83.0	81.7	80.4	79.1	77.8
120	97.1	95.8	94.6	93.3	91.9	90.6	89.2	87.8	86.3	84.9
130	105.2	103.8	102.4	101.0	99.6	98.1	96.6	95.1	93.5	91.9
140	113.3	111.8	110.3	108.8	107.2	105.7	104.0	102.4	100.7	99.0
150	121.4	119.8	118.2	116.6	114.9	113.2	111.5	109.7	107.9	106.1
160	129.4	127.8	126.1	124.3	122.6	120.8	118.9	117.0	115.1	113.1
170	137.5	135.8	134.0	132.1	130.2	128.3	126.3	124.3	122.3	120.2
180	145.6	143.8	141.8	139.9	137.9	135.8	133.8	131.6	129.5	127.3
190	153.7	151.7	149.7	147.7	145.5	143.4	141.2	139.0	136.7	134.4
200	161.8	159.7	157.6	155.4	153.2	150.9	148.6	146.3	143.9	141.4
210	169.9	167.7	165.5	163.2	160.9	158.5	156.1	153.6	151.1	148.5
220	178.0	175.7	173.4	171.0	168.5	166.0	163.5	160.9	158.3	155.6
230	186.1	183.7	181.2	178.7	176.2	173.6	170.9	168.2	165.4	162.6
240	194.2	191.7	189.1	186.5	183.9	181.1	178.4	175.5	172.6	169.7
250	202.3	199.7	197.0	194.3	191.5	188.7	185.8	182.8	179.8	176.8
260	210.3	207.6	204.9	202.1	199.2	196.2	193.2	190.2	187.0	183.8
270	218.4	215.6	212.8	209.8	206.8	203.8	200.6	197.5	194.2	190.9
280	226.5	223.6	220.6	217.6	214.5	211.3	208.1	204.8	201.4	198.0
290	234.6	231.6	228.5	225.4	222.2	218.9	215.5	212.1	208.6	205.1
300	242.7	239.6	236.4	233.1	229.8	226.4	222.9	219.4	215.8	212.1
	54°	53°	52°	51°	50°	49°	48°	47°	46°	45°
Dist.	Angle of the Course.									

Departure.

Departure.

Dist.	Angle of the Course.									
	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°
1	0.6	0.6	0.6	0.6	0.6	0.7	0.7	0.7	0.7	0.7
2	1.2	1.2	1.2	1.3	1.3	1.3	1.3	1.4	1.4	1.4
3	1.8	1.8	1.8	1.9	1.9	2.0	2.0	2.0	2.1	2.1
4	2.4	2.4	2.5	2.5	2.6	2.6	2.7	2.7	2.8	2.8
5	2.9	3.0	3.1	3.1	3.2	3.3	3.3	3.4	3.5	3.5
6	3.5	3.6	3.7	3.8	3.9	3.9	4.0	4.1	4.2	4.2
7	4.1	4.2	4.3	4.4	4.5	4.6	4.7	4.8	4.9	4.9
8	4.7	4.8	4.9	5.0	5.1	5.2	5.4	5.5	5.6	5.7
9	5.3	5.4	5.5	5.7	5.8	5.9	6.0	6.1	6.3	6.4
10	5.9	6.0	6.2	6.3	6.4	6.6	6.7	6.8	6.9	7.1
20	11.8	12.0	12.3	12.6	12.9	13.1	13.4	13.6	13.9	14.1
30	17.6	18.1	18.5	18.9	19.3	19.7	20.1	20.5	20.8	21.2
40	23.5	24.1	24.6	25.2	25.7	26.2	26.8	27.3	27.8	28.3
50	29.4	30.1	30.8	31.5	32.1	32.8	33.5	34.1	34.7	35.4
60	35.3	36.1	36.9	37.8	38.6	39.4	40.1	40.9	41.7	42.4
70	41.1	42.1	43.1	44.1	45.0	45.9	46.8	47.7	48.6	49.5
80	47.0	48.1	49.3	50.3	51.4	52.5	53.5	54.6	55.6	56.6
90	52.9	54.2	55.4	56.6	57.9	59.0	60.2	61.4	62.5	63.6
100	58.8	60.2	61.6	62.9	64.3	65.6	66.9	68.2	69.5	70.7
110	64.7	66.2	67.7	69.2	70.7	72.2	73.6	75.0	76.4	77.8
120	70.5	72.2	73.9	75.5	77.1	78.7	80.3	81.8	83.4	84.9
130	76.4	78.2	80.0	81.0	83.6	85.3	87.0	88.7	90.3	91.9
140	82.3	84.3	86.2	88.8	90.0	91.8	93.7	95.5	97.3	99.0
150	88.2	90.3	92.3	94.4	96.4	98.4	100.4	102.3	104.2	106.1
160	94.0	96.3	98.5	100.7	102.8	105.0	107.1	109.1	111.1	113.1
170	99.9	102.3	104.7	107.0	109.3	111.5	113.8	115.9	118.1	120.2
180	105.8	108.3	110.8	113.3	115.7	118.1	120.4	122.8	125.0	127.3
190	111.7	114.3	117.0	119.6	122.1	124.7	127.1	129.6	132.0	134.4
200	117.6	120.4	123.1	125.9	128.6	131.2	133.8	136.4	138.9	141.4
210	123.4	126.4	129.3	132.2	135.0	137.8	140.5	143.2	145.9	148.5
220	129.3	132.4	135.4	138.5	141.4	144.3	147.2	150.0	152.8	155.6
230	135.2	138.4	141.6	144.7	147.8	150.9	153.9	156.9	159.8	162.6
240	141.1	144.4	147.8	151.0	154.3	157.5	160.6	163.7	166.7	169.7
250	146.9	150.5	153.9	157.3	160.7	164.0	167.3	170.5	173.7	176.8
260	152.8	156.5	160.1	163.6	167.1	170.6	174.0	177.3	180.6	183.8
270	158.7	162.5	166.2	169.9	173.6	177.1	180.7	184.1	187.6	190.9
280	164.6	168.5	172.4	176.2	180.0	183.7	187.4	191.0	194.5	198.0
290	170.5	174.5	178.5	182.5	186.4	190.3	194.0	197.8	201.5	205.1
300	176.3	180.5	184.7	188.8	192.8	196.8	200.7	204.6	208.4	212.1
Dist.	54°	53°	52°	51°	50°	49°	48°	47°	46°	45°
	Angle of the Course.									

Difference of Latitude.

TABLE XVI.

MERIDIONAL PARTS.

′	Latitude. 0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
0	0.0	60.0	120.0	180.1	240.2	300.4	360.7	421.1	481.6	542.2	603.1	664.1	725.3
1	1.0	61.0	121.0	181.1	241.2	301.4	361.7	422.1	482.6	543.3	604.1	665.1	726.3
2	2.0	62.0	122.0	182.1	242.2	302.4	362.7	423.1	483.6	544.3	605.1	666.1	727.4
3	3.0	63.0	123.0	183.1	243.2	303.4	363.7	424.1	484.6	545.3	606.2	667.2	728.4
4	4.0	64.0	124.0	184.1	244.2	304.4	364.7	425.1	485.6	546.3	607.2	668.2	729.4
5	5.0	65.0	125.0	185.1	245.2	305.4	365.7	426.1	486.6	547.3	608.2	669.2	730.5
6	6.0	66.0	126.0	186.1	246.2	306.4	366.7	427.1	487.6	548.3	609.2	670.2	731.5
7	7.0	67.0	127.0	187.1	247.2	307.4	367.7	428.1	488.6	549.3	610.2	671.2	732.5
8	8.0	68.0	128.0	188.1	248.2	308.4	368.7	429.1	489.6	550.3	611.2	672.2	733.5
9	9.0	69.0	129.0	189.1	249.2	309.4	369.7	430.1	490.7	551.4	612.2	673.3	734.6
10	10.0	70.0	130.0	190.1	250.2	310.4	370.7	431.1	491.7	552.4	613.2	674.3	735.6
11	11.0	71.0	131.0	191.1	251.2	311.4	371.7	432.1	492.7	553.4	614.2	675.3	736.6
12	12.0	72.0	132.0	192.1	252.2	312.4	372.7	433.1	493.7	554.4	615.3	676.3	737.6
13	13.0	73.0	133.0	193.1	253.2	313.4	373.7	434.2	494.7	555.4	616.3	677.3	738.6
14	14.0	74.0	134.0	194.1	254.2	314.4	374.7	435.2	495.7	556.4	617.3	678.4	739.6
15	15.0	75.0	135.0	195.1	255.2	315.4	375.7	436.2	496.7	557.4	618.3	679.4	740.7
16	16.0	76.0	136.0	196.1	256.2	316.4	376.8	437.2	497.7	558.4	619.3	680.4	741.7
17	17.0	77.0	137.0	197.1	257.2	317.5	377.8	438.2	498.7	559.4	620.3	681.4	742.7
18	18.0	78.0	138.0	198.1	258.2	318.5	378.8	439.2	499.8	560.5	621.3	682.4	743.7
19	19.0	79.0	139.0	199.1	259.2	319.5	379.8	440.2	500.8	561.5	622.4	683.5	744.8
20	20.0	80.0	140.0	200.1	260.2	320.5	380.8	441.2	501.8	562.5	623.4	684.5	745.8
21	21.0	81.0	141.0	201.1	261.3	321.5	381.8	442.2	502.8	563.5	624.4	685.5	746.8
22	22.0	82.0	142.0	202.1	262.3	322.5	382.8	443.2	503.8	564.5	625.4	686.5	747.8
23	23.0	83.0	143.0	203.1	263.3	323.5	383.8	444.2	504.8	565.5	626.4	687.5	748.9
24	24.0	84.0	144.0	204.1	264.3	324.5	384.8	445.2	505.8	566.6	627.4	688.6	749.9
25	25.0	85.0	145.0	205.1	265.3	325.5	385.8	446.3	506.8	567.6	628.5	689.6	750.9
26	26.0	86.0	146.0	206.1	266.3	326.5	386.8	447.3	507.8	568.6	629.5	690.6	751.9
27	27.0	87.0	147.0	207.1	267.3	327.5	387.8	448.3	508.9	569.6	630.5	691.6	753.0
28	28.0	88.0	148.0	208.1	268.3	328.5	388.8	449.3	509.9	570.6	631.5	692.6	754.0
29	29.0	89.0	149.0	209.1	269.3	329.5	389.8	450.3	510.9	571.6	632.5	693.6	755.0
30	30.0	90.0	150.0	210.1	270.3	330.5	390.8	451.3	511.9	572.6	633.5	694.7	756.0
31	31.0	91.0	151.1	211.1	271.3	331.5	391.8	452.3	512.9	573.7	634.6	695.7	757.1
32	32.0	92.0	152.1	212.1	272.3	332.5	392.9	453.3	513.9	574.7	635.6	696.7	758.1
33	33.0	93.0	153.1	213.1	273.3	333.5	393.9	454.3	514.9	575.7	636.6	697.7	759.1
34	34.0	94.0	154.1	214.1	274.3	334.5	394.9	455.3	515.9	576.7	637.6	698.7	760.1
35	35.0	95.0	155.1	215.1	275.3	335.5	395.9	456.3	516.9	577.7	638.6	699.8	761.2
36	36.0	96.0	156.1	216.1	276.3	336.5	396.9	457.3	518.0	578.7	639.6	700.8	762.2
37	37.0	97.0	157.1	217.1	277.3	337.5	397.9	458.4	519.0	579.7	640.7	701.8	763.2
38	38.0	98.0	158.1	218.2	278.3	338.5	398.9	459.4	520.0	580.8	641.7	702.8	764.2
39	39.0	99.0	159.1	219.2	279.3	339.6	399.9	460.4	521.0	581.8	642.7	703.8	765.2
40	40.0	100.0	160.1	220.2	280.3	340.6	400.9	461.4	522.0	582.8	643.7	704.9	766.3
41	41.0	101.0	161.1	221.2	281.3	341.6	401.9	462.4	523.0	583.8	644.7	705.9	767.3
42	42.0	102.0	162.1	222.2	282.3	342.6	402.9	463.4	524.0	584.8	645.8	706.9	768.3
43	43.0	103.0	163.1	223.2	283.3	343.6	403.9	464.4	525.0	585.8	646.8	707.9	769.3
44	44.0	104.0	164.1	224.2	284.3	344.6	404.9	465.4	526.0	586.8	647.8	709.0	770.4
45	45.0	105.0	165.1	225.2	285.3	345.6	405.9	466.4	527.1	587.9	648.8	710.0	771.4
46	46.0	106.0	166.1	226.2	286.3	346.6	407.0	467.4	528.1	588.9	649.8	711.0	772.4
47	47.0	107.0	167.1	227.2	287.3	347.6	408.0	468.4	529.1	589.9	650.8	712.0	773.4
48	48.0	108.0	168.1	228.2	288.3	348.6	409.0	469.5	530.1	590.9	651.9	713.1	774.5
49	49.0	109.0	169.1	229.2	289.3	349.6	410.0	470.5	531.1	591.9	652.9	714.1	775.5
50	50.0	110.0	170.1	230.2	290.3	350.6	411.0	471.5	532.1	592.9	653.9	715.1	776.5
51	51.0	111.0	171.1	231.2	291.3	351.6	412.0	472.5	533.1	593.9	654.9	716.1	777.5
52	52.0	112.0	172.1	232.2	292.4	352.6	413.0	473.5	534.1	595.0	655.9	717.1	778.6
53	53.0	113.0	173.1	233.2	293.4	353.6	414.0	474.5	535.1	596.0	657.0	718.2	779.6
54	54.0	114.0	174.1	234.2	294.4	354.6	415.0	475.5	536.2	597.0	658 0	719.2	780.6
55	55.0	115.0	175.1	235.2	295.4	355.6	416.0	476.5	537.2	598.0	659.0	720.2	781.7
56	56.0	116.0	176.1	236.2	296.4	356.6	417.0	477.5	538.2	599.0	660.0	721.2	782.7
57	57.0	117.0	177.1	237.2	297.4	357.6	418.0	478.5	539.2	600.0	661.0	722.3	783.7
58	58.0	118.0	178.1	238.2	298.4	358.6	419.0	479.5	540.2	601.0	662.1	723.3	784.7
59	59.0	119.0	179.1	239.2	299.4	359.7	420.0	480.5	541.2	602.1	663.1	724.3	785.8
60	60.0	120.0	180.1	240.2	300.4	360.7	421.1	481.6	542.2	603.1	664.1	725.3	786.8

′	Latitude.											
	13°	14°	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°
0	786.8	848.5	910.5	972.7	1035.3	1098.2	1161.5	1225.1	1289.2	1353.7	1418.6	1484.1
1	787.8	849.5	911.5	973.8	1036.3	1099.3	1162.5	1226.2	1290.3	1354.8	1419.7	1485.2
2	788.8	850.6	912.6	974.8	1037.4	1100.3	1163.6	1227.3	1291.3	1355.8	1420.8	1486.3
3	789.9	851.6	913.6	975.9	1038.4	1101.4	1164.7	1228.3	1292.4	1356.9	1421.9	1487.3
4	790.9	852.6	914.6	976.9	1039.5	1102.4	1165.7	1229.4	1293.5	1358.0	1423.0	1488.4
5	791.9	853.6	915.7	978.0	1040.5	1103.5	1166.8	1230.4	1294.5	1359.0	1424.1	1489.5
6	792.9	854.7	916.7	979.0	1041.6	1104.5	1167.8	1231.5	1295.6	1360.1	1425.1	1490.6
7	794.0	855.7	917.7	980.0	1042.6	1105.6	1168.9	1232.6	1296.7	1361.2	1426.2	1491.7
8	795.0	856.7	918.8	981.1	1043.7	1106.6	1170.0	1233.6	1297.8	1362.3	1427.3	1492.8
9	796.0	857.8	919.8	982.1	1044.7	1107.7	1171.0	1234.7	1298.8	1363.4	1428.4	1493.9
10	797.1	858.8	920.8	983.2	1045.8	1108.7	1172.1	1235.8	1299.9	1364.5	1429.5	1495.0
11	798.1	859.8	921.9	984.2	1046.8	1109.8	1173.1	1236.8	1301.0	1365.6	1430.6	1496.1
12	799.1	860.9	922.9	985.2	1047.9	1110.8	1174.2	1237.9	1302.0	1366.6	1431.7	1497.2
13	800.1	861.9	923.9	986.3	1048.9	1111.9	1175.2	1239.0	1303.1	1367.7	1432.8	1498.3
14	801.2	862.9	925.0	987.3	1049.9	1112.9	1176.3	1240.0	1304.2	1368.8	1433.9	1499.4
15	802.2	864.0	926.0	988.4	1051.0	1114.0	1177.4	1241.1	1305.3	1369.9	1434.9	1500.5
16	803.2	865.0	927.0	989.4	1052.0	1115.0	1178.4	1242.2	1306.3	1370.9	1436.0	1501.6
17	804.2	866.0	928.1	990.4	1053.1	1116.1	1179.5	1243.3	1307.4	1372.0	1437.1	1502.7
18	805.3	867.1	929.1	991.5	1054.1	1117.1	1180.5	1244.3	1308.5	1373.1	1438.2	1503.8
19	806.3	868.1	930.1	992.5	1055.2	1118.2	1181.6	1245.4	1309.6	1374.2	1439.3	1504.9
20	807.3	869.1	931.2	993.6	1056.2	1119.2	1182.7	1246.4	1310.6	1375.3	1440.4	1506.0
21	808.4	870.1	932.2	994.6	1057.3	1120.3	1183.7	1247.5	1311.7	1376.4	1441.5	1507.1
22	809.4	871.2	933.3	995.6	1058.3	1121.3	1184.8	1248.6	1312.8	1377.4	1442.6	1508.2
23	810.4	872.2	934.3	996.7	1059.4	1122.4	1185.8	1249.6	1313.8	1378.5	1443.7	1509.3
24	811.4	873.2	935.3	997.7	1060.4	1123.4	1186.9	1250.7	1314.9	1379.6	1444.8	1510.4
25	812.5	874.3	936.3	998.8	1061.4	1124.5	1188.0	1251.8	1316.0	1380.7	1445.8	1511.5
26	813.5	875.3	937.4	999.8	1062.5	1125.5	1189.0	1252.8	1317.1	1381.8	1446.9	1512.6
27	814.5	876.3	938.4	1000.8	1063.5	1126.6	1190.1	1253.9	1318.1	1382.8	1448.0	1513.7
28	815.5	877.4	939.5	1001.9	1064.6	1127.6	1191.1	1255.0	1319.2	1383.9	1449.1	1514.8
29	816.6	878.4	940.5	1002.9	1065.6	1128.7	1192.2	1256.1	1320.3	1385.0	1450.2	1515.9
30	817.6	879.4	941.6	1004.0	1066.7	1129.7	1193.2	1257.1	1321.4	1386.1	1451.3	1517.0
31	818.6	880.5	942.6	1005.0	1067.7	1130.8	1194.3	1258.2	1322.5	1387.2	1452.4	1518.1
32	819.6	881.5	943.6	1006.1	1068.8	1131.8	1195.4	1259.2	1223.5	1388.3	1453.5	1519.2
33	820.7	882.5	944.7	1007.1	1069.8	1132.9	1196.4	1260.3	1324.6	1389.4	1454.6	1520.3
34	821.7	883.6	945.7	1008.1	1070.9	1134.0	1197.5	1261.4	1325.7	1390.4	1455.7	1521.4
35	822.7	884.6	946.7	1009.2	1072.0	1135.1	1198.5	1262.4	1326.7	1391.5	1456.7	1522.5
36	823.8	885.6	947.8	1010.2	1073.0	1136.1	1199.6	1263.5	1327.8	1392.6	1457.8	1523.6
37	824.8	886.7	948.8	1011.3	1074.1	1137.2	1200.7	1264.6	1328.9	1393.7	1458.9	1524.7
38	825.8	887.7	949.9	1012.3	1075.1	1138.2	1201.7	1265.6	1330.0	1394.9	1460.0	1525.8
39	826.9	888.7	950.9	1013.4	1076.2	1139.3	1202.8	1266.7	1331.1	1395.8	1461.1	1526.9
40	827.9	889.8	951.9	1014.4	1077.2	1140.3	1203.9	1267.8	1332.1	1396.9	1462.2	1528.0
41	828.9	890.8	953.0	1015.4	1078.3	1141.4	1204.9	1268.8	1333.2	1398.0	1463.3	1529.1
42	829.9	891.8	954.0	1016.5	1079.3	1142.4	1206.0	1269.9	1334.3	1399.1	1464.4	1530.2
43	831.0	892.9	955.0	1017.5	1080.4	1143.5	1207.1	1271.0	1335.3	1400.2	1465.5	1531.3
44	832.0	893.9	956.1	1018.6	1081.4	1144.6	1208.1	1272.1	1336.4	1401.3	1466.6	1532.4
45	833.0	894.9	957.1	1019.6	1082.5	1145.6	1209.2	1273.1	1337.5	1402.4	1467.7	1533.5
46	834.1	896.0	958.1	1020.6	1083.5	1146.7	1210.2	1274.2	1338.6	1403.4	1468.8	1534.6
47	835.1	897.0	959.2	1021.7	1084.6	1147.7	1211.3	1275.3	1339.7	1404.5	1469.8	1535.7
48	836.1	898.1	960.2	1022.7	1085.6	1148.8	1212.4	1276.3	1340.7	1405.6	1470.9	1536.8
49	837.2	899.1	961.3	1023.8	1086.7	1149.9	1213.4	1277.4	1341.8	1406.7	1472.0	1537.9
50	838.2	900.1	962.3	1024.8	1087.7	1150.9	1214.5	1278.5	1342.9	1407.8	1473.1	1539.0
51	839.2	901.2	963.4	1025.9	1088.8	1152.0	1215.5	1279.5	1344.0	1408.8	1474.2	1540.1
52	840.2	902.2	964.4	1026.9	1089.8	1153.0	1216.6	1280.6	1345.1	1409.9	1475.3	1541.2
53	841.3	903.2	965.5	1028.0	1090.9	1154.1	1217.7	1281.7	1346.1	1411.0	1476.4	1542.3
54	842.3	904.3	966.5	1029.0	1091.9	1155.1	1218.7	1282.8	1347.2	1412.1	1477.4	1543.5
55	843.3	905.3	967.5	1030.1	1093.0	1156.2	1219.8	1283.8	1348.3	1413.2	1478.6	1544.5
56	844.4	906.3	968.6	1031.1	1094.0	1157.2	1220.9	1284.9	1349.4	1414.3	1479.7	1545.6
57	845.4	907.4	969.6	1032.2	1095.1	1158.3	1221.9	1286.0	1350.4	1415.4	1480.8	1546.7
58	846.4	908.4	970.7	1033.2	1096.1	1159.4	1223.0	1287.0	1351.5	1416.5	1481.9	1547.8
59	847.5	909.4	971.7	1034.3	1097.2	1160.4	1224.1	1288.1	1352.6	1417.5	1483.0	1548.9
60	848.5	910.5	972.7	1035.3	1098.2	1161.5	1225.1	1289.2	1353.7	1418.6	1484.1	1550.0

′	Latitude. 25°	26°	27°	28°	29°	30°	31°	32°	33°	34°	35°
0	1550.0	1616.5	1683.5	1751.2	1819.4	1888.4	1958.0	2028.4	2099.5	2171.5	2244.3
1	1551.1	1617.6	1684.6	1752.3	1820.6	1889.5	1959.2	2029.6	2100.7	2172.7	2245.5
2	1552.2	1618.7	1685.8	1753.4	1821.7	1890.7	1960.4	2030.7	2101.9	2173.9	2246.8
3	1553.3	1619.8	1686.9	1754.6	1822.9	1891.9	1961.6	2031.9	2103.1	2175.1	2248.0
4	1554.4	1620.9	1688.0	1755.7	1824.0	1893.0	1962.7	2033.1	2104.3	2176.3	2249.2
5	1555.5	1622.0	1689.1	1756.8	1825.2	1894.1	1963.9	2034.3	2105.5	2177.5	2250.4
6	1556.6	1623.2	1690.3	1758.0	1826.3	1895.3	1965.0	2035.5	2106.7	2178.7	2251.6
7	1557.7	1624.3	1691.4	1759.1	1827.5	1896.5	1966.2	2036.7	2107.9	2180.0	2252.9
8	1558.8	1625.4	1692.5	1760.2	1828.6	1897.6	1967.4	2037.8	2109.1	2181.2	2254.1
9	1559.9	1626.5	1693.6	1761.4	1829.7	1898.8	1968.5	2039.0	2110.3	2182.4	2255.3
10	1561.0	1627.6	1694.8	1762.5	1830.9	1899.9	1969.7	2040.2	2111.5	2183.6	2256.5
11	1562.1	1628.7	1695.9	1763.6	1832.0	1901.1	1970.9	2041.4	2112.7	2184.8	2257.8
12	1563.3	1629.8	1697.0	1764.8	1833.2	1902.3	1972.0	2042.6	2113.9	2186.0	2259.0
13	1564.4	1631.0	1698.1	1765.9	1834.3	1903.4	1973.2	2043.8	2115.1	2187.2	2260.2
14	1565.5	1632.1	1699.3	1767.0	1835.5	1904.6	1974.4	2044.9	2116.3	2188.4	2261.4
15	1566.6	1633.2	1700.4	1768.2	1836.6	1905.7	1975.6	2046.1	2117.5	2189.6	2262.7
16	1567.7	1634.3	1701.5	1769.3	1837.8	1906.9	1976.8	2047.3	2118.7	2190.8	2263.9
17	1568.8	1635.4	1702.6	1770.5	1838.9	1908.1	1977.9	2048.5	2119.8	2192.0	2265.1
18	1569.9	1636.5	1703.8	1771.6	1840.1	1909.2	1979.1	2049.7	2121.0	2193.3	2266.3
19	1571.0	1637.6	1704.9	1772.7	1841.2	1910.4	1980.2	2050.8	2122.2	2194.4	2267.5
20	1572.1	1638.8	1706.0	1773.9	1842.4	1911.5	1981.4	2052.0	2123.4	2195.7	2268.8
21	1573.2	1639.9	1707.1	1775.0	1843.5	1912.7	1982.6	2053.2	2124.6	2196.9	2270.0
22	1574.3	1641.0	1708.3	1776.1	1844.6	1913.8	1983.7	2054.4	2125.8	2198.1	2271.2
23	1575.4	1642.1	1709.4	1777.2	1845.8	1915.0	1984.9	2055.6	2127.0	2199.3	2272.5
24	1576.5	1643.2	1710.5	1778.4	1846.9	1916.2	1986.1	2056.8	2128.2	2200.5	2273.7
25	1577.6	1644.3	1711.6	1779.5	1848.1	1917.3	1987.3	2058.0	2129.4	2201.7	2274.9
26	1578.7	1645.5	1712.8	1780.6	1849.2	1918.5	1988.4	2059.1	2130.6	2203.0	2276.1
27	1579.8	1646.6	1713.9	1781.8	1850.4	1919.6	1989.6	2060.3	2131.8	2204.2	2277.4
28	1580.9	1647.7	1715.0	1783.0	1851.5	1920.8	1990.8	2061.5	2133.0	2205.4	2278.6
29	1582.1	1648.8	1716.1	1784.1	1852.7	1921.9	1992.0	2062.7	2134.2	2206.6	2279.8
30	1583.2	1649.9	1717.3	1785.2	1853.8	1923.1	1993.1	2063.9	2135.4	2207.8	2281.0
31	1584.3	1651.0	1718.4	1786.4	1855.0	1924.3	1994.3	2065.1	2136.6	2209.0	2282.3
32	1585.4	1652.2	1719.5	1787.5	1856.1	1925.4	1995.5	2066.2	2137.8	2210.2	2283.5
33	1586.5	1653.3	1720.7	1788.6	1857.2	1926.6	1996.6	2067.4	2139.0	2211.4	2284.7
34	1587.6	1654.4	1721.8	1789.8	1858.4	1927.8	1997.8	2068.6	2140.2	2212.7	2286.0
35	1588.7	1655.5	1722.9	1790.9	1859.6	1928.9	1999.0	2069.8	2141.4	2213.9	2287.2
36	1589.8	1656.6	1724.0	1792.1	1860.7	1930.1	2000.2	2071.0	2142.6	2215.1	2288.4
37	1590.9	1657.8	1725.2	1793.2	1861.9	1931.3	2001.3	2072.2	2143.8	2216.3	2289.7
38	1592.0	1658.9	1726.3	1794.3	1863.0	1932.4	2002.5	2073.4	2145.0	2217.5	2290.9
39	1593.1	1660.0	1727.4	1795.5	1864.2	1933.6	2003.7	2074.5	2146.2	2218.7	2292.1
40	1594.3	1661.1	1728.6	1796.6	1865.3	1934.7	2004.9	2075.7	2147.4	2219.9	2293.3
41	1595.4	1662.2	1729.7	1797.8	1866.5	1935.9	2006.0	2076.9	2148.6	2221.2	2294.6
42	1596.5	1663.4	1730.8	1798.9	1867.6	1937.1	2007.2	2078.1	2149.8	2222.4	2295.8
43	1597.6	1664.5	1731.9	1800.0	1868.8	1938.2	2008.4	2079.3	2151.0	2223.6	2297.0
44	1598.7	1665.6	1733.1	1801.2	1869.9	1939.4	2009.6	2080.5	2152.2	2224.8	2298.3
45	1599.8	1666.7	1734.2	1802.3	1871.1	1940.5	2010.7	2081.7	2153.4	2226.0	2299.5
46	1600.9	1667.8	1735.3	1803.5	1872.2	1941.7	2011.9	2082.9	2154.6	2227.2	2300.7
47	1602.0	1669.0	1736.5	1804.6	1873.4	1942.9	2013.1	2084.1	2155.8	2228.5	2302.0
48	1603.1	1670.1	1737.6	1805.7	1874.5	1944.0	2014.3	2085.3	2157.0	2229 7	2303.2
49	1604.2	1671.2	1738.7	1806.9	1875.7	1945.2	2015.4	2086.4	2158.2	2230.9	2304.4
50	1605.4	1672.3	1739.9	1808.0	1876.8	1946.4	2016.6	2087.7	2159.4	2232.1	2305.7
51	1606.5	1673.4	1741.0	1809.2	1878.0	1947.5	2017.8	2088.9	2160.7	2233.3	2306.9
52	1607.6	1674.5	1742.2	1810.3	1879.2	1948.7	2019.0	2090.1	2161.9	2234.6	2308.1
53	1608.7	1675.7	1743.3	1811.4	1880.3	1949.9	2020.2	2091.3	2163.1	2235.8	2309.4
54	1609.8	1676.8	1744.4	1812.6	1881.5	1951.0	2021.3	2092.5	2164.3	2237.0	2310.6
55	1610.9	1677.9	1745.5	1813.7	1882.6	1952.2	2022.5	2093.7	2165.5	2238.2	2311.8
56	1612.0	1679.1	1746.6	1814.9	1883.8	1953.4	2023.7	2094.9	2166.7	2239.4	2313.1
57	1613.1	1680.2	1747.8	1816.0	1884.9	1954.5	2024.9	2096.1	2167.9	2240.7	2314.3
58	1614.2	1681.3	1748.9	1817.2	1886.1	1955.7	2026.0	2097.2	2169.1	2241.9	2315.5
59	1615.3	1682.4	1750.0	1818.3	1887.2	1956.9	2027.2	2098.3	2170.3	2243.1	2316.8
60	1616.5	1683.5	1751.2	1819.4	1888.4	1958.0	2028.4	2099.5	2171.5	2244.3	2317.9

′	Latitude.										
	36°	37°	38°	39°	40°	41°	42°	43°	44°	45°	46°
0	2318.0	2392.6	2468.3	2545.0	2622.6	2701.6	2781.7	2863.1	2945.8	3030.0	3115.6
1	2319.2	2393.9	2469.5	2546.2	2624.0	2702.9	2783.1	2864.5	2947.2	3031.4	3117.0
2	2320.5	2395.1	2470.8	2547.5	2625.3	2704.3	2784.4	2865.8	2948.6	3032.8	3118.5
3	2321.7	2396.4	2472.1	2548.8	2626.6	2705.6	2785.8	2867.2	2950.0	3034.2	3119.9
4	2323.0	2397.7	2473.4	2550.0	2627.9	2706.9	2787.1	2868.5	2951.4	3035.6	3121.4
5	2324.2	2398.9	2474.6	2551.4	2629.2	2708.3	2788.5	2870.0	2952.8	3037.0	3122.8
6	2325.4	2400.2	2475.9	2552.7	2630.5	2709.6	2789.8	2871.3	2954.2	3038.4	3124.2
7	2326.7	2401.4	2477.1	2554.0	2631.9	2710.9	2791.2	2872.7	2955.6	3039.8	3125.7
8	2327.9	2402.7	2478.5	2555.3	2633.2	2712.2	2792.5	2874.1	2957.0	3041.3	3127.1
9	2329.1	2403.9	2479.7	2556.6	2634.5	2713.5	2793.8	2875.4	2958.3	3042.7	3128.5
10	2330.4	2405.2	2481.0	2557.8	2635.8	2714.9	2795.1	2876.8	2959.8	3044.1	3130.0
11	2331.6	2406.4	2482.2	2559.1	2637.1	2716.2	2796.5	2878.2	2961.1	3045.5	3131.5
12	2332.9	2407.7	2483.5	2560.4	2638.4	2717.5	2797.9	2879.5	2962.5	3047.0	3132.9
13	2334.1	2409.0	2484.8	2561.7	2639.7	2718.9	2799.3	2880.9	2963.9	3048.4	3134.5
14	2335.3	2410.2	2486.1	2563.0	2641.0	2720.2	2800.6	2882.3	2965.3	3049.8	3135.8
15	2336.6	2411.5	2487.4	2564.3	2642.3	2721.5	2802.0	2883.7	2966.7	3051.2	3137.2
16	2337.8	2412.7	2488.6	2565.6	2643.6	2722.9	2803.3	2885.0	2968.1	3052.6	3138.7
17	2339.0	2414.0	2489.9	2566.9	2644.9	2724.2	2804.7	2886.4	2969.5	3054.1	3140.1
18	2340.3	2415.2	2491.2	2568.2	2646.3	2725.5	2806.0	2887.8	2970.9	3055.5	3141.6
19	2341.5	2416.5	2492.4	2569.5	2647.6	2726.8	2807.3	2889.1	2972.3	3056.9	3143.0
20	2342.8	2417.8	2493.7	2570.7	2648.9	2728.2	2808.8	2890.5	2973.7	3058.3	3144.5
21	2344.0	2419.0	2495 0	2572.0	2650.3	2729.5	2810.1	2891.9	2975.1	3059.7	3145.9
22	2345.3	2420.3	2496.3	2573.3	2651.5	2730.8	2811.4	2893.3	2976.5	3061.2	3147.4
23	2346.5	2421.5	2497.6	2574.6	2652.8	2732.2	2812.8	2894.7	2977.9	3062.6	3148.8
24	2347.7	2422.8	2498.8	2575.9	2654.1	2733.5	2814.1	2896.0	2979.3	3064.0	3150.3
25	2349.0	2424.0	2500.1	2577.2	2655.5	2734.8	2815.5	2897.4	2980.7	3065.4	3151.7
26	2350.2	2425.3	2501.4	2578.5	2656.8	2736.2	2816.8	2898.8	2982.1	3066.9	3153.2
27	2351.5	2426.5	2502.7	2579.8	2658.1	2737.5	2818.2	2900.2	2983.5	3068.3	3154.6
28	2352.7	2427.8	2503.9	2581.1	2659.4	2738.8	2819.5	2901.5	2984.9	3069.7	3156.1
29	2354.0	2429.1	2505.2	2582.4	2660.7	2740.2	2820.9	2902.9	2986.3	3071.1	3157.5
30	2355.2	2430.3	2506.5	2583.7	2662.0	2741.5	2822.3	2904.3	2987.7	3072.6	3159.0
31	2356.5	2431.6	2507.8	2585.0	2663.3	2742.9	2823.6	2905.7	2989.1	3074.0	3160.4
32	2357.7	2432.9	2509.0	2586.3	2664.6	2744.2	2825.0	2907.1	2990.5	3075.4	3161.9
33	2358.9	2434.1	2510.3	2587.6	2666.0	2745.5	2826.3	2908.4	2991.9	3076.9	3163.3
34	2360.2	2435.4	2511.6	2588.9	2667.3	2746.9	2827.7	2909.7	2993.3	3078.3	3164.8
35	2361.4	2436.7	2512.9	2590.2	2668.6	2748.2	2829.0	2911.2	2994.7	3079.7	3166.2
36	2362.7	2437.9	2514.2	2591.5	2669.9	2749.5	2830.4	2912.6	2996.1	3081.1	3167.7
37	2363.9	2439.2	2515.4	2592.8	2671.2	2750.9	2831.7	2914.0	2997.5	3082.6	3169.1
38	2365.2	2440.4	2516.7	2594.1	2672.5	2752.2	2833.1	2915.3	2998.9	3084.0	3170.6
39	2366.4	2441.7	2518 0	2595.4	2673.9	2753.5	2834.5	2916.7	3000.3	3085.4	3172.0
40	2367.6	2443.0	2519.3	2596.7	2675.2	2754.9	2835.8	2918.1	3001.8	3086.9	3173.5
41	2368.9	2444.2	2520.5	2598 0	2676.5	2756.2	2837.2	2919.5	3003.2	3088.3	3175.0
42	2370.2	2445.5	2521.8	2599.3	2677.8	2757.6	2838.6	2920.9	3004.6	3089.7	3176.4
43	2371.4	2446.8	2523.1	2600.5	2679.1	2758.9	2839.9	2922.3	3006.0	3091.2	3177.9
44	2372.6	2448.0	2524.4	2601.9	2680.5	2760.2	2841.3	2923.6	3007.4	3092.6	3179.3
45	2373.9	2449.3	2525.7	2603.2	2681.8	2761.5	2842.6	2925.0	3008.8	3094.0	3180.8
46	2375.1	2450.6	2527.0	2604.5	2683.1	2762.9	2844.0	2926.4	3010.2	3095.5	3182.3
47	2376.4	2451.8	2528.3	2605.8	2684.4	2764.3	2845.4	2927.8	3011.6	3096.9	3183.7
48	2377.6	2453.1	2529.5	2607.1	2685.7	2765.6	2846.7	2929.1	3013.0	3098.3	3185.2
49	2378.9	2454.3	2530.8	2608.4	2687.1	2766.9	2848.1	2930.6	3014.4	3099.7	3186.6
50	2380.1	2455.6	2532.1	2609.7	2688.4	2768.3	2849.5	2932.0	3015.8	3101.2	3188.1
51	2381.4	2456.9	2533.4	2611.0	2689.7	2769.6	2850.8	2933.3	3017.2	3102.6	3189.6
52	2382.6	2458.1	2534.7	2612.3	2691.0	2771.0	2852.2	2934.7	3018.7	3104.1	3191.0
53	2383.9	2459.4	2536.0	2613.6	2692.3	2772.3	2853.5	2936.1	3020.1	3105.6	3192.5
54	2385.1	2460.7	2537.2	2614.9	2693.7	2773.7	2854.9	2937.5	3021.5	3107.0	3194.0
55	2386 4	2461.9	2538.5	2616.2	2695.0	2775.0	2856.3	2938.9	3022.9	3108.4	3195.4
56	2387.6	2463.2	2539.8	2617.5	2696.3	2776.3	2857.7	2940.3	3024.3	3109.8	3196.9
57	2388.9	2464.5	2541.1	2618.8	2697.6	2777.7	2859.0	2941.7	3025.7	3111.2	3198.4
58	2390.2	2465.8	2542.4	2620.1	2699.0	2779.0	2860.5	2943.1	3027.1	3112.7	3199.8
59	2391.4	2467.0	2543.6	2621.4	2700.3	2780.4	2861.7	2944.4	3028.5	3114.1	3201.3
60	2392.6	2468.3	2545.0	2622.6	2701.6	2781.7	2863.1	2945.8	3030.0	3115.6	3202.7

TABLE XVI.—Meridional Parts.

′	Latitude.										
	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°	57°
0	3202.7	3291.5	3382.1	3474.5	3568.8	3665.2	3763.8	3864.6	3968.0	4073.9	4182.6
1	3204.2	3293.0	3383.6	3476.0	3570.4	3666.8	3765.4	3866.3	3969.7	4075.7	4184.5
2	3205.7	3294.5	3385.1	3477.6	3572.0	3668.4	3767.1	3868.0	3971.5	4077.5	4186.3
3	3207.1	3296.0	3386.7	3479.1	3573 6	3670.1	3768.8	3869.7	3973.2	4079.3	4188.1
4	3208.6	3297.5	3388.2	3480.7	3575.2	3671.7	3770.4	3871.5	3975.0	4081.1	4190.0
5	3210.1	3299.0	3389.7	3482.3	3576.8	3673.3	3772.1	3873.2	3976.7	4082.9	4191.8
6	3211.5	3300.5	3391.3	3483.8	3578.4	3675.0	3773.7	3874.9	3978.4	4084.7	4193.7
7	3213.0	3302.0	3392.8	3485.4	3579.9	3676.6	3775.4	3876.6	3980.2	4086.4	4195.5
8	3214.5	3303.5	3394.3	3487.0	3581.5	3678.2	3777.1	3878.3	3982.0	4088.2	4197.3
9	3215.9	3305.0	3395.8	3488.5	3583.1	3679.8	3778.7	3880.0	3983.7	4090.0	4199.2
10	3217.4	3306.5	3397.4	3490.1	3584.7	3681.5	3780.4	3881.7	3985.4	4091.8	4201.0
11	3218.9	3308.0	3398.9	3491.6	3586.3	3683.1	3782.1	3883.4	3987.2	4093.6	4202.9
12	3220.3	3309.5	3400.4	3493.2	3587.9	3684.7	3783.8	3885.1	3988.9	4095.4	4204.7
13	3221.8	3311.0	3402.0	3494.7	3589.5	3686.4	3785.4	3886.8	3990.7	4097.2	4206.6
14	3223.3	3312.5	3403.5	3496.3	3591.1	3688.0	3787.1	3888.5	3992.5	4099.0	4208.4
15	3224.8	3314.0	3405.0	3497.9	3592.7	3689.6	3788.8	3890.2	3994.2	4100.8	4210.3
16	3226.2	3315.5	3406.6	3499.4	3594.3	3691.3	3790.4	3892.0	3996.0	4102.6	4212.1
17	3227.7	3317.0	3408.1	3501.0	3595.9	3692.9	3792.1	3893.7	3997.7	4104.4	4214.0
18	3229.2	3318.5	3409.6	3502.6	3597.5	3694.5	3793.8	3895.4	3999.5	4106.2	4215.8
19	3230.7	3320.0	3411.1	3504.1	3599.1	3696.2	3795.5	3897.1	4001.2	4108.0	4217.7
20	3232.1	3321.5	3412.7	3505.7	3600.7	3697.8	3797.1	3898.8	4003.0	4109.8	4219.5
21	3233.6	3323.0	3414.2	3507.3	3602.3	3699.4	3798.8	3900.5	4004.7	4111.6	4221.4
22	3235.1	3324.5	3415.7	3508.8	3603.9	3701.1	3800.5	3902.2	4006.5	4113.4	4223.2
23	3236.6	3326.0	3417.3	3510.4	3605.5	3702.7	3802.2	3904.0	4008.3	4115.2	4225.1
24	3238.0	3327.5	3418.8	3512.0	3607.1	3704.3	3803.8	3905.7	4010.0	4117.1	4227.0
25	3239.5	3329.0	3420.4	3513.5	3608.7	3706.0	3805.5	3907.4	4011.8	4118.9	4228.8
26	3241.0	3330.6	3421.9	3515.1	3610.3	3707.6	3807.2	3909.1	4013.5	4120.7	4230.6
27	3242.5	3332.1	3423.5	3516.7	3611.9	3709.3	3808.9	3910.8	4015.3	4122.5	4232.5
28	3244.0	3333.6	3425.0	3518.3	3613.6	3710.9	3810.5	3912.5	4017.1	4124.3	4234.4
29	3245.4	3335.1	3426.5	3519.8	3615.1	3712.6	3812.2	3914.3	4018.8	4126.1	4236.2
30	3246.9	3336.6	3428.0	3521.4	3616.7	3714.2	3813.9	3916.0	4020.6	4127.9	4238.1
31	3248.4	3338.1	3429.6	3523.0	3618.4	3715.8	3815.6	3917.7	4022.4	4129.7	4240.0
32	3249.9	3339.6	3431.1	3524.6	3620.0	3717.5	3817.3	3919.4	4024.1	4131.5	4241.8
33	3251.4	3341.1	3432.7	3526.1	3621.6	3719.1	3819.0	3921.2	4025.9	4133.3	4243.7
34	3252.8	3342.6	3434.2	3527.7	3623.2	3720.8	3820.6	3922.9	4027.7	4135.2	4245.5
35	3254.3	3344.1	3435.8	3529.3	3624.8	3722.4	3822.3	3924.6	4029.4	4137.0	4247.4
36	3255.8	3345.7	3437.3	3530.8	3626.4	3724.1	3824.0	3926.3	4031.2	4138.8	4249.3
37	3257.3	3347.2	3438.8	3532.4	3628.0	3725.7	3825.7	3928.1	4033.0	4140.6	4251.1
38	3258.8	3348.7	3440.4	3534.0	3629.6	3727.4	3827.4	3929.8	4034.8	4142.4	4253.0
39	3260.3	3350.2	3441.9	3535.6	3631.3	3729.0	3829.1	3931.5	4036.5	4144.2	4254.9
40	3261.7	3351.7	3443.5	3537.1	3632.8	3730.7	3830.8	3933.2	4038.3	4146.1	4256.7
41	3263.2	3353.2	3445.0	3538.7	3634.4	3732.3	3832.4	3935.0	4040.0	4147.9	4258.6
42	3264.7	3354.7	3446.6	3540.3	3636.1	3734.0	3834.1	3936.7	4041.8	4149.7	4260.5
43	3266.2	3356.2	3448.1	3541.9	3637.7	3735.6	3835.8	3938.4	4043.6	4151.5	4262.3
44	3267.7	3357.8	3449.7	3543.5	3639.3	3737.3	3837.5	3940.2	4045.4	4153.4	4264.2
45	3269.2	3359.3	3451.2	3545.0	3640.9	3738.9	3839.2	3941.9	4047.2	4155.2	4266.1
46	3270.7	3360.8	3452.8	3546.6	3642.5	3740.6	3840.9	3943.6	4049.0	4157.0	4268.0
47	3272.1	3362.3	3454.3	3548.2	3644.1	3742.2	3842.6	3945.4	4050.7	4158.8	4269.8
48	3273.6	3363.8	3455.8	3549.8	3645.8	3743.9	3844.3	3947.1	4052.5	4160.7	4271.7
49	3275.1	3365.4	3457.4	3551.4	3647.4	3745.5	3846.0	3948.8	4054.3	4162.5	4273.6
50	3276.6	3366.9	3459.0	3553.0	3649.0	3747.2	3847.7	3950.6	4056.1	4164.3	4275.5
51	3278.1	3368.4	3460.5	3554.6	3650.6	3748.8	3849.4	3952.3	4057.8	4166.1	4277.4
52	3279.6	3369.9	3462.0	3556.1	3652.2	3750.5	3851.1	3954.0	4059.6	4168.0	4279.2
53	3281.1	3371.4	3463.6	3557.7	3653.8	3752.2	3852.8	3955.8	4061.4	4169.8	4281.1
54	3282.6	3373.0	3465.2	3559.3	3655.5	3753.8	3854.4	3957.5	4063.2	4171.6	4283.0
55	3284.1	3374.5	3466.7	3560.9	3657.1	3755.5	3856.1	3959.3	4065.0	4173.5	4284.9
56	3285.6	3376.0	3468.3	3562.5	3658.7	3757.1	3857.8	3961.0	4066.8	4175.3	4286.8
57	3287.1	3377.5	3469.8	3564.0	3660.3	3758.8	3859.5	3962.7	4068.5	4177.1	4288.6
58	3288.5	3379.0	3471.4	3565.6	3662.0	3760.4	3861.2	3964.5	4070.3	4179.0	4290.5
59	3290.0	3380.6	3473.0	3567.2	3663.6	3762.1	3862.9	3966.2	4072.1	4180.8	4292.4
60	3291.5	3382.1	3474.5	3568.8	3665.2	3763.8	3864.6	3968.0	4073.9	4182.6	4294.3

Latitude.

′	58°	59°	60°	61°	62°	63°	64°	65°	66°	67°	68°
0	4294.3	4409.1	4527.4	4649.2	4775.0	4904.9	5039.4	5178.8	5323 5	5474.0	5630.8
1	4296.3	4411.1	4529.4	4651.3	4777.1	4907.1	5041.7	5181.2	5326.0	5476.6	5633.5
2	4298.1	4413.0	4531.4	4653.4	4779.3	4909.4	5044.0	5183.5	5328.4	5479.1	5636.2
3	4300.0	4415.0	4533.4	4655.4	4781.4	4911.6	5046.3	5185.9	5330.9	5481.7	5638.8
4	4301.9	4416.9	4535.4	4657.5	4783.5	4913.8	5048.6	5188.3	5333.4	5484.3	5641.5
5	4303.7	4418.9	4537.4	4659.6	4785.8	4916.0	5050.9	5190.7	5335.8	5486.9	5644.2
6	4305.6	4420.8	4539.4	4661.6	4787.9	4918.2	5053.1	5193.1	5338.3	5489.4	5646.9
7	4307.6	4422.7	4541.4	4663.7	4790.0	4920.4	5055.4	5195.4	5340.8	5492.0	5649.6
8	4309.4	4424.7	4543.4	4665.8	4792.1	4922.6	5057.7	5197.8	5343.2	5494.5	5652.3
9	4311.3	4426.7	4545.4	4667.8	4794.2	4924.8	5060.0	5200.2	5345.7	5497.1	5654.9
10	4313.2	4428.6	4547.4	4669.9	4796.3	4927.0	5062.3	5202.6	5348.2	5499.7	5657.6
11	4315.1	4430.6	4549.4	4672.0	4798.5	4929.2	5064.6	5204.9	5350.7	5502.3	5660.3
12	4317.0	4432.5	4551.4	4674.1	4800.6	4931.5	5066.9	5207.3	5353.1	5504.9	5663.0
13	4318.9	4434.5	4553.5	4676.1	4802.8	4933.7	5069.2	5209.7	5355.6	5507.4	5665.7
14	4320.8	4436.4	4555.5	4678.2	4804.9	4935.9	5071.5	5212.1	5358.1	5510.0	5668.4
15	4322.7	4438.4	4557.5	4680.3	4807.1	4938.1	5073.8	5214.5	5360.6	5512.6	5671.1
16	4324.6	4440.3	4559.5	4682.4	4809.2	4940.3	5076.1	5216.9	5363.1	5515.2	5673.8
17	4326.5	4442.3	4561.5	4684.5	4811.4	4942.6	5078.4	5219.3	5365.6	5517.8	5676.5
18	4328.4	4444.2	4563.5	4686.5	4813.5	4944.8	5080.7	5221.6	5368.0	5520.4	5679.2
19	4330.3	4446.2	4565.5	4688.6	4815.7	4947.0	5083.0	5224.0	5370.5	5523.0	5681.9
20	4332.2	4448.2	4567.6	4690.7	4817.8	4949.2	5085.3	5226.4	5373.0	5525.6	5684.6
21	4334.1	4450.1	4569.6	4692.8	4820.0	4951.5	5087.6	5228.8	5375.5	5528.1	5687.3
22	4336.0	4452.1	4571.6	4694.9	4822.1	4953.7	5090.0	5231.2	5378.0	5530.8	5690.0
23	4338.0	4454.1	4573.6	4697.0	4824.3	4955.9	5092.3	5233.6	5380.5	5533.3	5692.7
24	4339.8	4456.0	4575.7	4699.1	4826.4	4958.2	5094.6	5236.0	5383.0	5535.9	5695.5
25	4341.8	4458.0	4577.7	4701.1	4828.6	4960.4	5096.9	5238.4	5385.5	5538.6	5698.2
26	4343.7	4460.0	4579.7	4703.2	4830.8	4962.6	5099.2	5240.8	5388.0	5541.2	5700.9
27	4345.6	4461.9	4581.7	4705.3	4832.9	4964.9	5101.5	5243.2	5390.5	5543.8	5703.6
28	4347.5	4463.9	4583.8	4707.4	4835.1	4967.1	5103.8	5245.7	5393.0	5546.4	5706.3
29	4349.4	4465.9	4585.8	4709.5	4837.3	4969.4	5106.2	5248.1	5395.5	5549.0	5709.1
30	4351.3	4467.8	4587.8	4711.6	4839.4	4971.6	5108.5	5250.5	5398.0	5551.6	5711.8
31	4353.2	4469.8	4589.9	4713.7	4841.6	4973.8	5110.8	5252.9	5400.5	5554.2	5714.5
32	4355.1	4471.8	4591.9	4715.8	4843.8	4976.1	5113.1	5255.3	5403.0	5556.8	5717.3
33	4357.1	4473.7	4593.9	4717.9	4845.9	4978.3	5115.5	5257.7	5405.5	5559.4	5720.1
34	4359.0	4475.7	4596.0	4720.0	4848.1	4980.6	5117.8	5260.1	5408.1	5562.1	5722.7
35	4360.9	4477.7	4598.0	4722.1	4850.3	4982.8	5120.1	5262.6	5410.6	5564.7	5725.5
36	4362.8	4479.7	4600.0	4724.2	4852.4	4985.1	5122.4	5265.0	5413.1	5567.3	5728.3
37	4364.7	4481.6	4602.1	4726.3	4854.6	4987.3	5124.8	5267.4	5415 6	5569.9	5730.9
38	4366.7	4483.6	4604.1	4728.4	4856.8	4989.6	5127.1	5269.8	5418.1	5572.6	5733.7
39	4368.6	4485.6	4606.2	4730.5	4859.0	4991.8	5129.4	5272.2	5420.6	5575.2	5736.4
40	4370.5	4487.6	4608.2	4732.6	4861.1	4994.1	5131.8	5274.7	5423.2	5577.8	5739.2
41	4372.4	4489.6	4610.2	4734.7	4863.3	4996.3	5134.1	5277.1	5425.7	5580.4	5741.9
42	4374.3	4491.5	4612.3	4736.8	4865.5	4998.6	5136.5	5279.5	5428.2	5583.1	5744.7
43	4376.3	4493.5	4614.3	4739.0	4867.7	5000.8	5138.8	5282.0	5430.8	5585.7	5747.5
44	4378.2	4495.5	4616.4	4741.1	4869.9	5003.1	5141.1	5284.4	5433.3	5588.4	5750.2
45	4380.1	4497.5	4618.4	4743.2	4872.0	5005.4	5143.5	5286.8	5435.8	5591.0	5752.9
46	4382.1	4499.5	4620.5	4745.3	4874.3	5007.6	5145.8	5289.3	5438.4	5593.6	5755.7
47	4384.0	4501.5	4622.5	4747.4	4876.4	5009.9	5148.2	5291.7	5440.9	5596.3	5758.5
48	4385.9	4503.4	4624.5	4749.5	4878.6	5012.2	5150.5	5294.1	5443.4	5598.9	5761.2
49	4387.8	4505.4	4626.6	4751.6	4880.8	5014.4	5152.9	5296.6	5446.0	5601.6	5764.0
50	4389.8	4507.4	4628.7	4753.7	4883.0	5016.7	5155.2	5299.0	5448.5	5604.2	5766.8
51	4391.7	4509.4	4630.6	4755.9	4885.2	5018.9	5157.6	5301.5	5451.1	5606.9	5769.5
52	4393.7	4511.4	4632.8	4758.0	4887.3	5021.2	5160.0	5303.9	5453.6	5609.6	5772.3
53	4395.6	4513.4	4634.8	4760.1	4889.6	5023.5	5162.3	5306.4	5456.1	5612.2	5775.1
54	4397.5	4515.4	4636.9	4762.2	4891.8	5025.8	5164.6	5308.8	5458.7	5614.8	5777.9
55	4399.4	4517.4	4639.0	4764.4	4894.0	5028.0	5167.0	5311.2	5461.2	5617.5	5780.6
56	4401.4	4519.4	4641.0	4766.5	4896.2	5030.4	5169.4	5313.7	5463.8	5620.2	5783.4
57	4403.3	4521.4	4643.0	4768.6	4898.4	5032.6	5171.7	5316.2	5466.3	5622.9	5786.2
58	4405.3	4523.4	4645.1	4770.7	4900.5	5034.9	5174.1	5318.6	5468.9	5625.5	5789.0
59	4407.2	4525.4	4647.2	4772.9	4902.7	5037.1	5176.4	5321.1	5471.4	5628.2	5791.8
60	4409.1	4527.4	4649.2	4775.0	4904.9	5039.4	5178.8	5323.5	5474.0	5630.8	5794.6

Latitude.

′	69°	70°	71°	72°	73°	74°	75°	76°	77°	78°	79°
0	5794.6	5965.9	6145.7	6334.8	6534.4	6745.7	6970.3	7210.1	7467.2	7744.6	8045.7
1	5797.4	5968.8	6148.8	6338.1	6537.9	6749.4	6974.2	7214.2	7471.7	7749.4	8051.0
2	5800.1	5971.8	6151.9	6341.3	6541.3	6753.0	6978.1	7218.4	7476.1	7754.2	8056.2
3	5802.9	5974.7	6154.9	6344.6	6544.7	6756.6	6981.9	7222.5	7480.6	7759.0	8061.5
4	5805.8	5977.6	6158.0	6347.8	6548.1	6760.3	6985.8	7226.6	7485.0	7763.9	8066.7
5	5808.5	5980.6	6161.1	6351.1	6551.6	6763.9	6989.7	7230.8	7489.5	7768.7	8072.0
6	5811.3	5983·5	6164.2	6354.3	6555.0	6767.6	6993.6	7235.0	7494.0	7773.6	8077.3
7	5814.2	5986.4	6167.3	6357.6	6558.5	6771.2	6997.5	7239.1	7498.5	7778.4	8082.6
8	5817.0	5989.4	6170.4	6360.8	6561.9	6774.9	7001.4	7243.3	7503.0	7783.3	8087.9
9	5819.8	5992.3	6173.5	6364.1	6565.3	6778.6	7005.3	7247.5	7507.4	7788.1	8093.2
10	5822.6	5995.3	6176.6	6367.4	6568.8	6782.2	7009.2	7251.7	7511.9	7793.0	8098.5
11	5825.4	5998.2	6179.7	6370.6	6572.3	6785.8	7013.1	7255.8	7516.5	7797.9	8103.8
12	5828.2	6001.2	6182.8	6373.9	6575.7	6789.6	7017.0	7260.0	7521.0	7802.8	8109.2
13	5831.0	6004.1	6185.9	6377.2	6579.2	6793.2	7020.9	7264.2	7525.5	7807.7	8114.5
14	5833.8	6007.1	6189.0	6380.4	6582.6	6796.9	7024.9	7268.4	7530.0	7812.6	8119.9
15	5836.7	6010.0	6192.1	6383.7	6586.1	6800.6	7028.8	7272.5	7534.5	7817.5	8125.2
16	5839.5	6013.0	6195.2	6387.0	6589.6	6804.3	7032.7	7276.8	7539.1	7822.4	8130.6
17	5842.3	6016.0	6198.3	6390.3	6593.1	6807.9	7036.6	7281.1	7543.6	7827.3	8136.0
18	5845.1	6018.9	6201.4	6393.6	6596.5	6811.6	7040.6	7285.3	7548.2	7832.2	8141.3
19	5848.0	6021.9	6204.6	6396.9	6600.0	6815.4	7044.5	7289.5	7552.7	7837.2	8146.7
20	5850.8	6024.9	6207.7	6400.2	6603.5	6819.1	7048.5	7293.7	7557.3	7842.1	8152.1
21	5853.6	6027.8	6210.8	6403.4	6607.0	6822.8	7052.4	7298.0	7561.8	7847.1	8157.5
22	5856.5	6030.8	6213.9	6406.7	6610.5	6826.4	7056.4	7302.2	7566.4	7852.0	8163.0
23	5859.3	6033.8	6217.0	6410.1	6614.0	6830.2	7060.3	7306.4	7571.0	7857.0	8168.4
24	5862.2	6036.8	6220.1	6413.4	6617.5	6833.9	7064.3	7310.7	7575.5	7861.9	8173.8
25	5865.0	6039.8	6223.3	6416.7	6621.0	6837.6	7068.3	7315.0	7580.1	7866.9	8179.2
26	5867.8	6042.7	6226.5	6420.0	6624.5	6841.3	7072.2	7319.2	7584.7	7871.9	8184.7
27	5870.7	6045.7	6229.6	6423.3	6628.0	6845.1	7076.2	7323.5	7589.3	7876.9	8190.2
28	5873.5	6048.7	6232.7	6426.6	6631.5	6848.8	7080.2	7327.7	7593.9	7881.9	8195.6
29	5876.4	6051.7	6235.9	6429.9	6635.0	6852.5	7084.2	7332.0	7598.5	7886.9	8201.1
30	5879.2	6054.7	6239.0	6433.3	6638.5	6856.2	7088.2	7336.3	7603.2	7891.9	8206.6
31	5882.1	6057.7	6242.2	6436.6	6642.1	6860.0	7092.3	7340.6	7607.8	7896.9	8212.1
32	5885.0	6060.7	6245.4	6439.9	6645.6	6863.8	7096.3	7344.9	7612.4	7902.0	8217.6
33	5887.8	6063.7	6248.5	6443.2	6649.1	6867.5	7100.2	7349.2	7617.0	7907.0	8223.1
34	5890.7	6066.7	6251.7	6446.6	6652.6	6871.3	7104.1	7353.5	7621.7	7912.0	8228.6
35	5893.6	6069.7	6254.8	6449.9	6656.2	6875.0	7108.2	7357.8	7626.3	7917.0	8234.1
36	5896.4	6072.7	6258.0	6453.3	6659.7	6878.8	7112.2	7362.1	7631.0	7922.1	8239.7
37	5899.3	6075.7	6261.2	6456.6	6663.3	6882.7	7116.3	7366.4	7635.7	7927.2	8245.2
38	5902.2	6078.8	6264.3	6460.0	6666.8	6886.3	7120.3	7370.7	7640.3	7932.3	8250.8
39	5905.0	6081.8	6267.5	6463.3	6670.4	6890.1	7124.3	7375.1	7645.0	7937.4	8256.3
40	5907.9	6084.8	6270.7	6466.7	6673.9	6893.9	7128.4	7379.4	7649.7	7942.4	8261.9
41	5910.8	6087.8	6273.9	6470.0	6677.4	6897.6	7132.4	7383.7	7654.4	7947.5	8267.5
42	5913.7	6090.8	6277.1	6473.4	6681.0	6901.5	7136.4	7388.1	7659.0	7952.6	8273.1
43	5916.6	6093.9	6280.2	6476.8	6684.6	6905.3	7140.5	7392.4	7663.7	7957.7	8278.7
44	5919.4	6096.9	6283.4	6480·1	6688.2	6909.1	7144.5	7396.8	7668.4	7962.8	8284.3
45	5922.3	6099.9	6286.6	6483.5	6691.7	6912.9	7148.6	7401.2	7673.2	7968.0	8289.9
46	5925.2	6103.0	6289.8	6486.9	6695.3	6916.7	7152.7	7405.5	7677.9	7973.1	8295.5
47	5928.1	6106.0	6293.0	6490.2	6698.9	6920.5	7156.7	7409.9	7682.6	7978.2	8301.1
48	5931.0	6109.0	6296.2	6493.6	6702.5	6924.3	7160.8	7414.3	7687.3	7983.4	8306.7
49	5933.9	6112.1	6299.4	6497.0	6706.1	6928.1	7164.9	7418.6	7692.1	7988.5	8312.4
50	5936.8	6115.1	6302.6	6500.4	6709.7	6931.9	7169.0	7423.0	7696.8	7993.7	8318.1
51	5939.7	6118.2	6305.8	6503.8	6713.2	6935.7	7173.1	7427.4	7701.5	7998.9	8323.8
52	5942.6	6121.2	6309.1	6507.2	6716.8	6939.6	7177.2	7431.8	7706.3	8004.0	8329.4
53	5945.5	6124.3	6312.2	6510.6	6720.4	6943.4	7181.2	7436.2	7711.1	8009.2	8335.1
54	5948.4	6127.3	6315.5	6514.0	6724.0	6947.2	7185.3	7440.6	7715.8	8014.4	8340.8
55	5951.3	6130.4	6318.7	6517.4	6727.7	6951.1	7189.5	7445.1	7720.6	8019.5	8346.5
56	5954.2	6133.4	6321.9	6520.7	6731.3	6954.9	7193.6	7449.5	7725.4	8024.8	8352.2
57	5957.2	6136.5	6325.1	6524.2	6734.9	6958.8	7197.7	7453.9	7730.2	8030.0	8358.0
58	5960.1	6139.6	6328.4	6527.6	6738.5	6962.6	7201.8	7458.3	7735.0	8035.2	8363.7
59	5963.0	6142.6	6331.6	6531.0	6742.1	6966.5	7205.9	7462.8	7739.8	8040.5	8369.4
60	5965.9	6145.7	6334.8	6534.4	6745.7	6970.3	7210.1	7467.2	7744.6	8045.7	8375.2

′	Latitude.									
	80°	81°	82°	83°	84°	85°	86°	87°	88°	89°
0	8375.2	8739.1	9145.5	9605.8	10136.9	10764.6	11532.5	12522.1	13916.4	16299.6
1	8381.0	8745.5	9152.6	9614.0	10146.5	10776.1	11546.9	12541.3	13945.2	16357.3
2	8386.7	8751.9	9159.9	9622.3	10156.1	10787.7	11561.3	12560.5	13974.2	16416.1
3	8392.5	8758.3	9167.1	9630.5	10165.7	10799.2	11575.8	12579.9	14003.5	16475.9
4	8398.3	8764.7	9174.3	9638.8	10175.4	10810.8	11590.3	12599.4	14033.0	16536.8
5	8404.1	8771.2	9181.6	9647.1	10185.1	10822.5	11605.1	12619.0	14062.8	16598.7
6	8409.9	8777.6	9188.8	9655.4	10194.8	10834.2	11619.6	12638.7	14092.8	16661.8
7	8415.7	8784.1	9196.1	9663.7	10204.5	10845.9	11634.4	12658.5	14123.1	16726.0
8	8421.6	8790.6	9203.4	9672.1	10214.3	10857.7	11649.2	12678.5	14153.7	16791.5
9	8427.4	8797.1	9210.7	9680.5	10224.1	10869.5	11664.0	12698.5	14184.5	16858.3
10	8433.3	8803.6	9218.1	9688.9	10233.9	10881.4	11678.9	12718.7	14215.6	16926.4
11	8439.1	8810.1	9225.4	9697.3	10243.8	10893.2	11693.9	12739.0	14247.0	16995.8
12	8445.0	8816.6	9232.8	9705.7	10253.6	10905.1	11709.0	12759.4	14278.7	17066.7
13	8450.9	8823.2	9240.2	9714.2	10263.5	10917.1	11724.1	12779.9	14310.7	17139.1
14	8456.8	8829.7	9247.5	9722.6	10273.5	10929.1	11739.3	12800.6	14343.0	17213.0
15	8462.7	8836.3	9255.0	9731.1	10283.5	10941.2	11754.6	12821.4	14375.6	17288.6
16	8468.6	8842.9	9262.4	9739.7	10293.5	10953.3	11769.9	12842.3	14408.5	17365.8
17	8474.5	8849.5	9269.8	9748.2	10303.5	10965.4	11785.3	12863.3	14441.7	17444.9
18	8480.4	8856.1	9277.3	9756.8	10313.5	10977.6	11800.7	12884.5	14475.2	17525.8
19	8486.4	8862.7	9284.7	9765.3	10323.6	10989.8	11816.3	12905.8	14509.1	17608.6
20	8492.3	8869.3	9292.2	9773.9	10333.7	11002.1	11831.9	12927.2	14543.3	17693.5
21	8498.2	8876.0	9299.7	9782.6	10343.9	11014.4	11847.5	12948.7	14577.9	17780.5
22	8504.3	8882.6	9307.3	9791.2	10354.0	11026.8	11863.3	12970.4	14612.8	17869.8
23	8510.2	8889.2	9314.8	9799.9	10364.2	11039.2	11879.1	12992.3	14648.0	17961.5
24	8516.2	8896.0	9322.3	9808.6	10374.5	11051.6	11895.0	13014.4	14683.7	18055.7
25	8522.2	8902.7	9329.9	9817.3	10384.7	11064.1	11911.0	13036.4	14719.7	18152.5
26	8528.2	8909.4	9337.5	9826.0	10395.1	11076.6	11927.0	13058.6	14756.1	18252.2
27	8534.3	8916.1	9345.1	9834.8	10405.4	11089.2	11943.1	13081.0	14792.8	18354.9
28	8540.3	8922.8	9352.7	9843.5	10415.7	11101.8	11959.3	13103.6	14830.0	18460.6
29	8546.3	8929.6	9360.4	9852.4	10426.1	11114.5	11975.6	13126.3	14867.6	18569.8
30	8552.4	8936.3	9368.0	9861.2	10436.5	11127.2	11991.9	13149.1	14905.6	18682.5
31	8558.5	8943.1	9375.7	9870.0	10447.0	11140.0	12008.3	13172.1	14944.0	18799.0
32	8564.5	8949.9	9383.4	9878.9	10457.4	11152.8	12024.8	13195.3	14982.8	18919.7
33	8570.5	8956.7	9391.1	9887.8	10468.0	11165.7	12041.4	13218.6	15022.1	19044.7
34	8576.7	8963.5	9398.8	9896.7	10478.5	11178.6	12058.1	13242.1	15061.9	19174.4
35	8582.8	8970.3	9406.5	9905.6	10489.1	11191.6	12074.8	13265.7	15102.1	19309.3
36	8588.9	8977.2	9414.3	9914.6	10499.7	11204.6	12091.6	13289.5	15142.8	19449.6
37	8595.1	8984.0	9422.1	9923.6	10510.3	11217.6	12108.5	13313.5	15183.9	19595.9
38	8601.2	8990.9	9429.8	9932.6	10521.0	11230.7	12125.5	13337.6	15225.6	19748.7
39	8607.4	8997.8	9437.7	9941.6	10531.7	11243.9	12142.6	13361.9	15267.8	19908.7
40	8613.5	9004.7	9445.5	9950.7	10542.5	11257.1	12159.7	13386.4	15310.5	20076.4
41	8619.7	9011.6	9453.3	9959.8	10553.2	11270.4	12177.0	13411.0	15353.8	20252.7
42	8625.9	9018.5	9461.3	9968.9	10564.0	11283.7	12194.3	13435.9	15397.6	20438.6
43	8632.1	9025.4	9469.1	9978.1	10574.9	11297.0	12211.7	13460.9	15441.9	20635.1
44	8638.3	9032.4	9477.0	9987.0	10585.8	11310.5	12229.2	13486.1	15486.9	20843.5
45	8644.5	9039.3	9484.9	9996.4	10596.7	11323.9	12246.8	13511.4	15532.4	21065.4
46	8650.7	9046.3	9492.8	10005.5	10607.6	11337.5	12264.5	13537.0	15578.6	21302.6
47	8656.9	9053.3	9500.8	10014.7	10618.6	11351.0	12282.3	13562.7	15625.3	21557.3
48	8663.2	9060.3	9508.7	10024.0	10629.6	11364.6	12300.1	13588.7	15672.8	21832.5
49	8669.5	9067.3	9516.7	10033.2	10640.7	11378.3	12318.1	13614.9	15720.8	22131.6
50	8675.7	9074.3	9524.7	10042.5	10651.8	11392.1	12336.2	13641.2	15769.6	22459.3
51	8682.0	9081.4	9532.7	10051.8	10662.9	11405.9	12354.3	13667.8	15819.1	22821.5
52	8688.3	9088.4	9540.8	10061.2	10674.0	11419.7	12372.5	13694.5	15869.3	23226.4
53	8694.6	9095.5	9548.9	10070.6	10685.2	11433.6	12390.9	13721.6	15920.2	23685.4
54	8700.9	9102.6	9556.9	10080.0	10696.5	11447.6	12409.3	13748.7	15971.9	24215.4
55	8707.3	9109.7	9565.0	10089.4	10707.7	11461.6	12427.9	13776.1	16024.4	24842.1
56	8713.6	9116.8	9573.2	10098.8	10719.0	11475.7	12446.5	13803.7	16077.7	25609.2
57	8719.9	9124.0	9581.3	10108.3	10730.4	11489.8	12465.3	13831.5	16131.8	26598.2
58	8726.3	9131.1	9589.5	10117.8	10741.8	11504.0	12484.1	13859.6	16186.8	27992.1
59	8732.7	9138.3	9597.6	10127.3	10753.2	11518.2	12503.0	13887.9	16242.7	30375.0
60	8739.1	9145.5	9605.8	10136.9	10764.6	11532.5	12522.1	13916.4	16299.6	∞

TABLE XVII.

⊙'s True Amplitude.—For determining the Variation of the Compass.

If the Magnetic Amplitude be to the right hand of the True, the Variation is *west*, and *vice versâ*.

Lat.	Declination.											
	0°	1°	2°	3°	4°	5°	6°	7°	8°	9°	10°	11°	12°
°	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′	° ′
0	0 0	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0
1	0 0	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0
2	0 0	1 0	2 0	3 0	4 0	5 0	6 0	7 0	8 0	9 0	10 0	11 0	12 0
3	0 0	1 0	2 0	3 0	4 0	5 0	6 0	7 1	8 1	9 1	10 1	11 1	12 1
4	0 0	1 0	2 0	3 0	4 1	5 1	6 1	7 1	8 1	9 1	10 2	11 2	12 2
5	0 0	1 0	2 0	3 0	4 1	5 1	6 1	7 2	8 2	9 2	10 3	11 3	12 3
6	0 0	1 0	2 0	3 1	4 1	5 1	6 2	7 3	8 3	9 3	10 4	11 4	12 4
7	0 0	1 0	2 1	3 1	4 2	5 2	6 3	7 4	8 4	9 4	10 5	11 5	12 5
8	0 0	1 0	2 1	3 2	4 3	5 3	6 4	7 5	8 5	9 5	10 6	11 7	12 7
9	0 0	1 0	2 1	3 2	4 3	5 3	6 5	7 5	8 6	9 7	10 8	11 8	12 9
10	0 0	1 1	2 2	3 3	4 4	5 5	6 6	7 7	8 8	9 9	10 10	11 11	12 12
11	0 0	1 1	2 2	3 3	4 4	5 6	6 7	7 9	8 9	9 10	10 12	11 13	12 14
12	0 0	1 1	2 3	3 4	4 5	5 7	6 8	7 10	8 11	9 12	10 14	11 15	12 16
13	0 0	1 2	2 3	3 5	4 6	5 8	6 10	7 11	8 12	9 14	10 15	11 17	12 19
14	0 0	1 2	2 3	3 5	4 7	5 9	6 11	7 13	8 15	9 17	10 18	11 20	12 22
15	0 0	1 2	2 4	3 6	4 8	5 11	6 13	7 15	8 17	9 19	10 21	11 23	12 25
16	0 0	1 3	2 5	3 7	4 10	5 12	6 14	7 17	8 19	9 22	10 24	11 27	12 29
17	0 0	1 3	2 5	3 8	4 11	5 13	6 16	7 19	8 22	9 25	10 27	11 30	12 33
18	0 0	1 3	2 6	3 9	4 12	5 15	6 19	7 22	8 25	9 28	10 30	11 34	12 38
19	0 0	1 3	2 7	3 10	4 14	5 17	6 21	7 24	8 28	9 31	10 34	11 38	12 42
20	0 0	1 4	2 8	3 12	4 16	5 19	6 23	7 27	8 31	9 35	10 39	11 43	12 47
21	0 0	1 4	2 9	3 13	4 17	5 21	6 25	7 30	8 34	9 39	10 43	11 48	12 52
22	0 0	1 5	2 10	3 14	4 19	5 24	6 28	7 33	8 38	9 43	10 48	11 53	12 58
23	0 0	1 5	2 11	3 15	4 21	5 26	6 31	7 36	8 42	9 47	10 53	11 58	13 3
24	0 0	1 6	2 12	3 17	4 23	5 29	6 34	7 40	8 46	9 52	10 58	12 4	13 9
25	0 0	1 6	2 13	3 19	4 25	5 31	6 37	7 44	8 50	9 56	11 3	12 9	13 15
26	0 0	1 7	2 14	3 21	4 27	5 34	6 41	7 48	8 55	10 1	11 9	12 15	13 22
27	0 0	1 7	2 15	3 22	4 29	5 37	6 44	7 52	8 59	10 6	11 15	12 22	13 29
28	0 0	1 8	2 16	3 24	4 32	5 40	6 48	7 56	9 4	10 12	11 21	12 29	13 37
29	0 0	1 9	2 17	3 26	4 34	5 43	6 52	8 0	9 9	10 18	11 27	12 36	13 45
30	0 0	1 10	2 19	3 28	4 37	5 47	6 56	8 5	9 15	10 24	11 34	12 44	13 53
31	0 0	1 10	2 20	3 30	4 40	5 50	7 0	8 10	9 21	10 31	11 41	12 52	14 2
32	0 0	1 11	2 22	3 33	4 43	5 54	7 5	8 16	9 27	10 38	11 49	13 0	14 11
33	0 0	1 11	2 23	3 35	4 46	5 58	7 10	8 21	9 33	10 45	11 57	13 9	14 21
34	0 0	1 12	2 25	3 37	4 50	6 2	7 15	8 27	9 40	10 52	12 5	13 18	14 32
35	0 0	1 13	2 27	3 40	4 53	6 6	7 20	8 33	9 47	11 0	12 14	13 28	14 43
36	0 0	1 14	2 28	3 43	4 57	6 11	7 25	8 40	9 54	11 9	12 24	13 39	14 54
37	0 0	1 15	2 30	3 45	5 1	6 16	7 31	8 47	10 2	11 18	12 34	13 49	15 6
38	0 0	1 16	2 32	3 48	5 5	6 21	7 37	8 54	10 11	11 27	12 44	14 1	15 18
39	0 0	1 17	2 34	3 52	5 9	6 26	7 44	9 1	10 19	11 37	12 55	14 13	15 31
40	0 0	1 18	2 37	3 55	5 14	6 32	7 51	9 9	10 28	11 47	13 6	14 25	15 45
41	0 0	1 19	2 39	3 59	5 18	6 38	7 58	9 18	10 38	11 58	13 18	14 39	16 0
42	0 0	1 21	2 41	4 2	5 23	6 44	8 5	9 26	10 48	12 9	13 31	14 53	16 15
43	0 0	1 22	2 44	4 6	5 28	6 51	8 13	9 35	10 58	12 21	13 44	15 7	16 31
44	0 0	1 23	2 47	4 10	5 34	6 58	8 21	9 45	11 9	12 34	13 58	15 23	16 48
45	0 0	1 25	2 50	4 15	5 40	7 5	8 30	9 55	11 21	12 47	14 13	15 39	17 6
46	0 0	1 26	2 53	4 19	5 46	7 12	8 39	10 6	11 33	13 1	14 29	15 57	17 25
47	0 0	1 28	2 56	4 24	5 52	7 21	8 49	10 18	11 47	13 16	14 45	16 15	17 45
48	0 0	1 30	2 59	4 29	5 59	7 29	8 59	10 30	12 1	13 31	15 3	16 34	18 6
49	0 0	1 31	3 3	4 35	6 6	7 38	9 10	10 42	12 15	13 48	15 21	16 55	18 28
50	0 0	1 33	3 7	4 40	6 14	7 48	9 21	10 56	12 30	14 5	15 40	17 16	18 52
51	0 0	1 35	3 11	4 46	6 22	7 58	9 34	11 10	12 47	14 24	16 1	17 39	19 18
52	0 0	1 37	3 15	4 52	6 30	8 8	9 46	11 25	13 4	14 43	16 23	18 3	19 44
53	0 0	1 39	3 20	4 59	6 40	8 20	10 0	11 41	13 22	15 4	16 46	18 29	20 13
54	0 0	1 42	3 24	5 7	6 49	8 32	10 15	11 58	13 42	15 26	17 11	18 57	20 43
55	0 0	1 45	3 29	5 14	6 59	8 44	10 30	12 16	14 3	15 50	17 37	19 26	21 15
56	0 0	1 47	3 35	5 22	7 10	8 58	10 46	12 35	14 25	16 15	18 6	19 57	21 50
57	0 0	1 50	3 41	5 31	7 22	9 13	11 4	12 56	14 48	16 42	18 36	20 31	22 26
58	0 0	1 53	3 47	5 40	7 34	9 28	11 22	13 18	15 13	17 10	19 8	21 7	23 6
59	0 0	1 57	3 53	5 50	7 47	9 45	11 43	13 41	15 41	17 41	19 42	21 44	23 49
60	0 0	2 0	4 0	6 0	8 1	10 2	12 4	14 6	16 10	18 14	20 19	22 26	24 34

⊙'s True Amplitude.—For determining the Variation of the Compass.

If the Magnetic Amplitude be to the right hand of the True, the Variation is *west*, and *vice versâ*.

Lat.	Declination.																	
	12°		13°		14°		15°		16°		17°		18°		19°		20°		21°		22°		23°		23° 30′	
°	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′	°	′
0	12	0	13	0	14	0	15	0	16	0	17	0	18	0	19	0	20	0	21	0	22	0	23	0	23	30
1	12	0	13	0	14	0	15	0	16	0	17	0	18	0	19	0	20	0	21	0	22	0	23	1	23	31
2	12	0	13	0	14	0	15	0	16	1	17	1	18	1	19	1	20	1	21	1	22	1	23	2	23	32
3	12	1	13	1	14	1	15	1	16	1	17	2	18	2	19	2	20	2	21	2	22	2	23	3	23	33
4	12	2	13	2	14	2	15	2	16	2	17	3	18	3	19	3	20	3	21	3	22	3	23	4	23	34
5	12	3	13	3	14	3	15	4	16	4	17	4	18	4	19	4	20	5	21	5	22	5	23	5	23	36
6	12	4	13	4	14	4	15	5	16	5	17	5	18	6	19	6	20	7	21	7	22	7	23	8	23	38
7	12	5	13	6	14	6	15	7	16	7	17	8	18	8	19	9	20	9	21	10	22	10	23	11	23	41
8	12	7	13	8	14	8	15	9	16	10	17	10	18	11	19	12	20	12	21	13	22	14	23	14	23	44
9	12	9	13	10	14	10	15	11	16	12	17	13	18	14	19	15	20	16	21	17	22	18	23	18	23	48
10	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20	20	21	21	22	22	23	23	23	53
11	12	14	13	15	14	16	15	17	16	18	17	20	18	21	19	22	20	24	21	25	22	26	23	27	23	58
12	12	16	13	18	14	19	15	21	16	22	17	23	18	25	19	26	20	28	21	30	22	31	23	33	24	3
13	12	19	13	21	14	22	15	24	16	26	17	28	18	30	19	31	20	33	21	35	22	37	23	39	24	9
14	12	22	13	24	14	26	15	28	16	30	17	32	18	34	19	36	20	38	21	41	22	43	23	45	24	16
15	12	25	13	28	14	30	15	33	16	35	17	37	18	40	19	42	20	44	21	46	22	49	23	51	24	23
16	12	29	13	32	14	34	15	37	16	40	17	43	18	45	19	48	20	51	21	53	22	56	23	59	24	30
17	12	33	13	36	14	39	15	42	16	45	17	48	18	51	19	54	20	57	22	0	23	4	24	7	24	38
18	12	38	13	41	14	44	15	47	16	51	17	54	18	57	20	1	21	5	22	8	23	12	24	15	24	47
19	12	42	13	46	14	50	15	53	16	57	18	1	19	5	20	8	21	12	22	16	23	21	24	24	24	56
20	12	47	13	51	14	55	15	59	17	4	18	8	19	12	20	16	21	21	22	25	23	30	24	34	25	6
21	12	52	13	57	15	1	16	6	17	11	18	15	19	20	20	24	21	30	22	34	23	40	24	45	25	17
22	12	58	14	3	15	8	16	13	17	18	18	23	19	28	20	33	21	39	22	44	23	50	24	56	25	28
23	13	3	14	9	15	15	16	20	17	26	18	31	19	37	20	43	21	49	22	55	24	1	25	7	25	40
24	13	9	14	16	15	22	16	28	17	34	18	40	19	46	20	53	21	59	23	6	24	13	25	19	25	53
25	13	15	14	23	15	29	16	36	17	43	18	49	19	56	21	3	22	10	23	18	24	25	25	32	26	6
26	13	22	14	30	15	37	16	45	17	52	18	59	20	7	21	14	22	22	23	30	24	38	25	46	26	20
27	13	29	14	38	15	45	16	54	18	1	19	9	20	18	21	26	22	34	23	43	24	52	26	1	26	35
28	13	37	14	46	15	54	17	3	18	11	19	20	20	29	21	38	22	47	23	57	25	6	26	16	26	51
29	13	45	14	54	16	3	17	13	18	22	19	32	20	41	21	51	23	1	24	12	25	22	26	22	27	8
30	13	53	15	3	16	13	17	23	18	34	19	44	20	54	22	5	23	16	24	27	25	38	26	49	27	25
31	14	2	15	13	16	23	17	34	18	46	19	57	21	8	22	20	23	31	24	43	25	56	27	7	27	44
32	14	11	15	23	16	34	17	46	18	58	20	10	21	22	22	35	23	47	25	0	26	13	27	26	28	3
33	14	21	15	34	16	46	17	59	19	11	20	24	21	37	22	51	24	4	25	18	26	32	27	46	28	24
34	14	32	15	45	16	58	18	12	19	25	20	38	21	53	23	7	24	22	25	37	26	52	28	7	28	45
35	14	43	15	57	17	11	18	26	19	40	20	54	22	10	23	25	24	41	25	57	27	13	28	30	29	8
36	14	54	16	9	17	24	18	40	19	55	21	11	22	27	23	44	25	1	26	18	27	35	28	53	29	32
37	15	6	16	22	17	38	18	55	20	11	21	28	22	46	24	3	25	21	26	40	27	58	29	17	29	57
38	15	18	16	35	17	53	19	10	20	28	21	47	23	5	24	24	25	43	27	3	28	23	29	44	30	24
39	15	31	16	50	18	8	19	27	20	46	22	6	23	26	24	46	26	7	27	28	28	49	30	11	30	52
40	15	45	17	5	18	25	19	45	21	5	22	26	23	47	25	9	26	31	27	54	29	17	30	40	31	22
41	16	0	17	21	18	42	20	3	21	25	22	48	24	10	25	33	26	57	28	21	29	46	31	11	31	54
42	16	15	17	37	19	0	20	23	21	46	23	10	24	34	25	59	27	24	28	50	30	16	31	43	32	27
43	16	31	17	55	19	19	20	43	22	3	23	34	25	0	26	26	27	53	29	20	30	49	32	18	33	3
44	16	48	18	13	19	39	21	5	22	32	23	59	25	26	26	55	28	24	29	53	31	23	32	54	33	46
45	17	6	18	33	20	0	21	28	22	57	24	25	25	55	27	25	28	56	30	27	31	59	33	33	34	20
46	17	25	18	54	20	23	21	53	23	23	24	53	26	25	27	57	29	30	31	3	32	38	34	14	35	2
47	17	45	19	16	20	47	22	18	23	50	25	23	26	57	28	31	30	6	31	42	33	19	34	57	35	47
48	18	6	19	39	21	12	22	45	24	20	25	54	27	31	29	7	30	44	32	23	34	3	35	44	36	35
49	18	28	20	3	21	38	23	14	24	51	26	28	28	6	29	45	31	25	33	6	34	49	36	33	37	26
50	18	52	20	29	22	7	23	45	25	24	27	3	28	44	30	26	32	9	33	53	35	38	37	26	38	20
51	19	18	20	57	22	37	24	18	25	59	27	41	29	25	31	9	32	55	34	43	36	32	38	23	39	19
52	19	44	21	26	23	9	24	52	26	36	28	21	30	7	31	56	33	45	35	36	37	29	39	24	40	22
53	20	13	21	57	23	43	25	28	27	16	29	4	30	54	32	45	34	38	36	33	38	30	40	29	41	29
54	20	43	22	30	24	18	26	7	27	58	29	50	31	43	33	38	35	35	37	34	39	36	41	40	42	43
55	21	15	23	6	24	57	26	50	28	43	30	39	32	36	34	35	36	36	38	40	40	47	42	56	44	3
56	21	50	23	43	25	38	27	34	29	32	31	32	33	33	35	36	37	42	39	51	42	4	44	20	45	29
57	22	26	24	23	26	22	28	22	30	24	32	28	34	34	36	42	38	54	41	9	43	27	45	51	47	4
58	23	6	25	7	27	10	29	14	31	20	33	29	35	40	37	54	40	12	42	33	44	59	47	30	48	48
59	23	49	25	54	28	1	30	10	32	21	34	35	36	52	39	12	41	37	44	6	46	40	49	21	50	44
60	24	34	26	44	28	56	31	10	33	27	35	47	38	10	40	37	43	10	45	47	48	32	51	24	52	54

TABLE XVIII.

AUGMENTED REFRACTIONS.

TABLE XVIII.—Augmented Refractions.

App. Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																					
	20		21		22		23		24		25		26		27		28		29		30	
° ′	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″
5 0	8	37	8	52	9	8	9	24	9	40	9	56	10	13	10	30	10	47	11	5	11	22
10	8	23	8	38	8	53	9	9	9	25	9	41	9	56	10	12	10	30	10	47	11	4
20	8	10	8	25	8	40	8	55	9	10	9	26	9	42	9	58	10	14	10	30	10	47
30	7	58	8	12	8	27	8	41	8	56	9	12	9	27	9	43	9	58	10	14	10	30
40	7	46	8	0	8	14	8	28	8	43	8	58	9	13	9	28	9	43	9	58	10	14
50	7	35	7	49	8	3	8	17	8	31	8	45	9	0	9	14	9	29	9	44	9	59
6 0	7	25	7	39	7	53	8	6	8	19	8	33	8	47	9	1	9	16	9	30	9	45
10	7	16	7	29	7	42	7	55	8	8	8	21	8	35	8	49	9	3	9	17	9	31
20	7	6	7	18	7	31	7	44	7	57	8	10	8	23	8	37	8	51	9	5	9	19
30	6	57	7	9	7	22	7	34	7	46	7	59	8	12	8	26	8	39	8	52	9	7
40	6	47	6	59	7	11	7	23	7	35	7	48	8	1	8	14	8	27	8	41	8	54
50	6	39	6	50	7	2	7	14	7	26	7	38	7	50	8	3	8	17	8	30	8	43
7 0	6	30	6	41	6	53	7	4	7	16	7	29	7	41	7	54	8	6	8	18	8	31
10	6	22	6	33	6	45	6	56	7	8	7	20	7	32	7	44	7	56	8	8	8	21
20	6	15	6	26	6	37	6	48	6	59	7	11	7	23	7	35	7	47	7	59	8	11
30	6	8	6	18	6	29	6	40	6	51	7	2	7	14	7	26	7	38	7	50	8	2
40	6	0	6	10	6	21	6	31	6	43	6	54	7	5	7	17	7	28	7	40	7	52
50	5	53	6	3	6	13	6	25	6	35	6	46	6	57	7	8	7	19	7	30	7	42
8 0	5	47	5	57	6	8	6	18	6	28	6	39	6	50	7	0	7	11	7	22	7	34
10	5	40	5	51	6	1	6	11	6	21	6	31	6	41	6	51	7	2	7	13	7	26
20	5	35	5	44	5	54	6	4	6	14	6	24	6	34	6	44	6	55	7	6	7	18
30	5	29	5	38	5	48	5	57	6	7	6	17	6	27	6	37	6	48	6	59	7	10
40	5	24	5	33	5	42	5	52	6	1	6	11	6	21	6	31	6	42	6	52	7	3
50	5	18	5	27	5	36	5	45	5	54	6	4	6	14	6	25	6	35	6	45	6	55
9 0	5	13	5	22	5	31	5	40	5	49	5	58	6	9	6	18	6	28	6	38	6	48
10	5	8	5	16	5	25	5	34	5	43	5	52	6	2	6	12	6	21	6	31	6	41
20	5	2	5	10	5	19	5	28	5	37	5	46	5	56	6	5	6	15	6	24	6	34
30	4	57	5	5	5	14	5	22	5	32	5	41	5	50	5	59	6	8	6	17	6	27
40	4	53	5	1	5	10	5	19	5	27	5	35	5	44	5	54	6	3	6	12	6	21
50	4	48	4	56	5	4	5	13	5	21	5	30	5	39	5	48	5	57	6	6	6	15
10 0	4	43	4	51	5	0	5	8	5	16	5	25	5	34	5	42	5	51	6	0	6	10
10	4	39	4	47	4	56	5	4	5	12	5	20	5	29	5	37	5	46	5	55	6	4
20	4	35	4	43	4	51	4	59	5	7	5	15	5	23	5	32	5	41	5	49	5	58
30	4	32	4	39	4	47	4	55	5	3	5	11	5	19	5	27	5	36	5	44	5	53
40	4	27	4	34	4	42	4	50	4	58	5	6	5	14	5	23	5	31	5	39	5	48
50	4	23	4	30	4	38	4	45	4	53	5	2	5	10	5	18	5	26	5	34	5	42
11 0	4	19	4	26	4	34	4	41	4	49	4	58	5	6	5	13	5	21	5	29	5	37
10	4	16	4	23	4	31	4	38	4	45	4	53	5	2	5	9	5	17	5	25	5	33
20	4	13	4	20	4	27	4	34	4	41	4	49	4	57	5	5	5	13	5	21	5	29
30	4	9	4	16	4	23	4	30	4	38	4	45	4	53	5	1	5	9	5	16	5	24
40	4	6	4	13	4	20	4	27	4	35	4	42	4	50	4	57	5	5	5	12	5	21
50	4	3	4	9	4	16	4	24	4	31	4	38	4	45	4	53	5	0	5	7	5	16
12 0	4	0	4	6	4	13	4	20	4	27	4	34	4	41	4	48	4	55	5	3	5	11
10	3	57	4	3	4	11	4	17	4	24	4	31	4	38	4	45	4	52	5	0	5	7
20	3	53	3	59	4	7	4	13	4	20	4	27	4	34	4	41	4	49	4	56	5	3
30	3	50	3	57	4	4	4	10	4	17	4	24	4	30	4	38	4	45	4	52	4	59
40	3	47	3	54	4	1	4	7	4	14	4	21	4	27	4	34	4	41	4	48	4	55
50	3	45	3	52	3	58	4	4	4	11	4	18	4	24	4	31	4	37	4	44	4	51
13 0	3	43	3	49	3	55	4	1	4	7	4	14	4	22	4	28	4	34	4	41	4	48
10	3	40	3	46	3	52	3	58	4	4	4	11	4	19	4	25	4	31	4	38	4	46
20	3	38	3	44	3	50	3	56	4	2	4	8	4	15	4	22	4	28	4	34	4	42
30	3	35	3	41	3	47	3	53	3	59	4	6	4	12	4	19	4	25	4	32	4	39
40	3	33	3	38	3	44	3	50	3	57	4	3	4	9	4	15	4	21	4	28	4	35
50	3	30	3	35	3	41	3	47	3	54	4	0	4	6	4	12	4	19	4	25	4	32
14 0	3	27	3	32	3	38	3	45	3	51	3	57	4	3	4	9	4	16	4	22	4	29
10	3	25	3	30	3	36	3	42	3	48	3	55	4	1	4	7	4	13	4	19	4	26
20	3	23	3	28	3	35	3	40	3	46	3	52	3	58	4	5	4	11	4	17	4	23
30	3	21	3	26	3	33	3	38	3	43	3	50	3	56	4	2	4	8	4	14	4	20
40	3	19	3	24	3	31	3	36	3	41	3	47	3	54	3	59	4	5	4	11	4	17
50	3	17	3	22	3	28	3	33	3	38	3	45	3	51	3	56	4	2	4	8	4	14
15 0	3	15	3	20	3	26	3	31	3	36	3	42	3	48	3	54	4	0	4	5	4	12

App. Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																					
	20		21		22		23		24		25		26		27		28		29		30	
° ′	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″
15 0	3	15	3	20	3	26	3	31	3	36	3	42	3	48	3	54	4	0	4	5	4	12
10	3	13	3	18	3	23	3	28	3	34	3	40	3	46	3	51	3	57	4	2	4	9
20	3	11	3	16	3	21	3	26	3	32	3	38	3	44	3	49	3	55	4	0	4	7
30	3	9	3	14	3	19	3	25	3	30	3	36	3	41	3	47	3	52	3	58	4	4
40	3	7	3	12	3	17	3	23	3	28	3	33	3	38	3	44	3	50	3	55	4	1
50	3	5	3	10	3	16	3	21	3	26	3	31	3	36	3	42	3	48	3	53	3	59
16 0	3	3	3	8	3	14	3	19	3	24	3	29	3	34	3	41	3	46	3	51	3	57
10	3	1	3	6	3	12	3	17	3	22	3	27	3	32	3	39	3	44	3	49	3	55
20	2	59	3	5	3	10	3	15	3	20	3	25	3	31	3	36	3	41	3	46	3	52
30	2	58	3	3	3	8	3	13	3	18	3	23	3	29	3	34	3	39	3	44	3	50
40	2	57	3	1	3	6	3	11	3	16	3	21	3	27	3	32	3	37	3	42	3	49
50	2	55	2	59	3	4	3	9	3	14	3	20	3	25	3	30	3	35	3	40	3	46
17 0	2	53	2	57	3	2	3	7	3	12	3	17	3	23	3	28	3	33	3	39	3	44
10	2	52	2	56	3	1	3	5	3	11	3	16	3	21	3	26	3	31	3	37	3	42
20	2	50	2	54	2	59	3	3	3	9	3	14	3	19	3	24	3	29	3	35	3	40
30	2	48	2	52	2	57	3	2	3	7	3	12	3	17	3	21	3	27	3	32	3	37
40	2	46	2	50	2	55	3	0	3	5	3	10	3	15	3	19	3	25	3	30	3	35
50	2	45	2	49	2	54	2	59	3	4	3	9	3	14	3	19	3	24	3	29	3	34
18 0	2	44	2	48	2	54	2	58	3	2	3	7	3	12	3	17	3	22	3	27	3	32
10	2	42	2	46	2	52	2	56	3	0	3	5	3	10	3	15	3	20	3	25	3	30
20	2	41	2	45	2	51	2	55	2	59	3	4	3	10	3	14	3	19	3	23	3	28
30	2	39	2	43	2	49	2	53	2	57	3	2	3	7	3	11	3	16	3	20	3	25
40	2	38	2	43	2	47	2	51	2	55	3	1	3	6	3	10	3	15	3	19	3	25
50	2	37	2	42	2	46	2	50	2	54	3	0	3	4	3	9	3	13	3	17	3	23
19 0	2	35	2	40	2	44	2	48	2	52	2	58	3	2	3	7	3	11	3	16	3	21
10	2	34	2	39	2	43	2	47	2	52	2	57	3	1	3	6	3	10	3	15	3	20
20	2	33	2	38	2	42	2	46	2	51	2	55	2	59	3	4	3	8	3	13	3	18
30	2	33	2	37	2	41	2	45	2	50	2	54	2	58	3	3	3	8	3	12	3	17
40	2	31	2	35	2	39	2	44	2	48	2	52	2	56	3	1	3	6	3	10	3	15
50	2	30	2	34	2	38	2	43	2	47	2	51	2	55	3	0	3	4	3	8	3	13
20 0	2	28	2	32	2	36	2	41	2	45	2	49	2	53	2	58	3	2	3	6	3	11
10	2	27	2	31	2	35	2	40	2	44	2	48	2	52	2	57	3	1	3	5	3	10
20	2	26	2	29	2	34	2	38	2	42	2	46	2	51	2	55	2	59	3	3	3	9
30	2	25	2	28	2	33	2	37	2	41	2	45	2	50	2	54	2	58	3	3	3	8
40	2	24	2	27	2	32	2	36	2	40	2	45	2	49	2	53	2	57	3	2	3	6
50	2	22	2	26	2	30	2	34	2	38	2	43	2	47	2	51	2	56	3	0	3	4
21 0	2	21	2	25	2	29	2	33	2	37	2	42	2	46	2	50	2	55	2	59	3	3
10	2	20	2	24	2	28	2	32	2	36	2	41	2	45	2	49	2	54	2	58	3	2
20	2	19	2	23	2	27	2	31	2	36	2	40	2	44	2	49	2	53	2	57	3	1
30	2	19	2	22	2	26	2	29	2	34	2	38	2	42	2	47	2	51	2	55	2	59
40	2	18	2	21	2	25	2	28	2	33	2	37	2	41	2	45	2	49	2	53	2	58
50	2	17	2	20	2	24	2	28	2	32	2	36	2	41	2	44	2	48	2	52	2	57
22 0	2	16	2	19	2	23	2	27	2	31	2	35	2	40	2	43	2	47	2	52	2	56
10	2	14	2	17	2	22	2	25	2	29	2	33	2	38	2	41	2	45	2	50	2	54
20	2	13	2	16	2	21	2	24	2	28	2	32	2	37	2	40	2	44	2	49	2	53
30	2	13	2	16	2	21	2	24	2	27	2	32	2	35	2	39	2	43	2	48	2	52
40	2	12	2	16	2	20	2	23	2	26	2	31	2	34	2	38	2	42	2	46	2	50
50	2	11	2	15	2	19	2	22	2	25	2	30	2	33	2	37	2	41	2	45	2	49
23 0	2	10	2	14	2	18	2	21	2	24	2	29	2	32	2	36	2	40	2	44	2	48
10	2	9	2	13	2	17	2	20	2	24	2	28	2	31	2	36	2	39	2	43	2	47
20	2	9	2	12	2	16	2	19	2	23	2	27	2	30	2	35	2	38	2	42	2	47
30	2	8	2	11	2	15	2	18	2	22	2	26	2	29	2	34	2	37	2	41	2	46
40	2	7	2	10	2	14	2	18	2	21	2	25	2	29	2	33	2	36	2	41	2	45
50	2	7	2	10	2	13	2	17	2	20	2	24	2	28	2	32	2	35	2	39	2	44
24 0	2	6	2	9	2	12	2	16	2	19	2	23	2	27	2	31	2	34	2	38	2	42
10	2	5	2	8	2	11	2	15	2	18	2	23	2	26	2	30	2	34	2	37	2	41
20	2	4	2	7	2	11	2	14	2	17	2	22	2	25	2	29	2	33	2	36	2	40
30	2	3	2	6	2	10	2	13	2	16	2	21	2	24	2	28	2	32	2	35	2	39
40	2	2	2	5	2	9	2	12	2	15	2	20	2	23	2	27	2	31	2	34	2	38
50	2	1	2	5	2	8	2	11	2	14	2	19	2	22	2	27	2	30	2	33	2	37
25 0	2	0	2	4	2	7	2	10	2	13	2	18	2	21	2	26	2	29	2	32	2	37

App. Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																					
	20		21		22		23		24		25		26		27		28		29		30	
° ′	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″
25 0	2	0	2	4	2	7	2	10	2	13	2	18	2	21	2	26	2	29	2	32	2	37
10	2	0	2	3	2	6	2	10	2	13	2	17	2	21	2	25	2	28	2	32	2	36
20	1	59	2	2	2	5	2	9	2	12	2	16	2	20	2	23	2	27	2	31	2	35
30	1	58	2	1	2	5	2	8	2	12	2	16	2	19	2	23	2	26	2	30	2	34
40	1	58	2	1	2	4	2	8	2	11	2	15	2	18	2	22	2	25	2	29	2	33
50	1	57	2	0	2	3	2	7	2	10	2	14	2	17	2	21	2	24	2	28	2	32
26 0	1	56	1	59	2	2	2	6	2	9	2	13	2	16	2	20	2	23	2	27	2	31
10	1	56	1	59	2	2	2	5	2	8	2	12	2	15	2	19	2	22	2	26	2	30
20	1	55	1	58	2	1	2	4	2	7	2	11	2	14	2	18	2	21	2	25	2	29
30	1	54	1	57	2	0	2	4	2	7	2	11	2	14	2	17	2	21	2	24	2	28
40	1	54	1	57	2	0	2	3	2	6	2	10	2	13	2	16	2	20	2	23	2	27
50	1	53	1	56	1	59	2	2	2	5	2	9	2	12	2	15	2	19	2	22	2	26
27 0	1	52	1	55	1	58	2	1	2	4	2	8	2	11	2	14	2	18	2	21	2	25
10	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	13	2	17	2	20	2	24
20	1	51	1	54	1	57	2	0	2	3	2	7	2	10	2	13	2	17	2	20	2	24
30	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	12	2	16	2	19	2	23
40	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	12	2	15	2	19	2	23
50	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11	2	15	2	18	2	22
28 0	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	14	2	17	2	21
10	1	49	1	52	1	54	1	57	2	0	2	3	2	6	2	9	2	13	2	16	2	20
20	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	12	2	15	2	19
30	1	48	1	51	1	53	1	56	1	59	2	2	2	5	2	8	2	11	2	14	2	18
40	1	47	1	50	1	52	1	55	1	58	2	1	2	4	2	7	2	11	2	14	2	18
50	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	13	2	17
29 0	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	12	2	16
10	1	45	1	48	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11	2	15
20	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11	2	14
30	1	44	1	47	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10	2	13
40	1	43	1	46	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	13
50	1	43	1	46	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9	2	12
30 0	1	42	1	45	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11
10	1	42	1	45	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8	2	11
20	1	42	1	44	1	47	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10
30	1	41	1	44	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7	2	10
40	1	41	1	43	1	46	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9
50	1	40	1	43	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6	2	9
31 0	1	39	1	42	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8
10	1	39	1	42	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5	2	8
20	1	38	1	41	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7
30	1	38	1	41	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4	2	7
40	1	37	1	40	1	42	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6
50	1	37	1	40	1	42	1	45	1	48	1	51	1	54	1	57	2	0	2	3	2	6
32 0	1	36	1	39	1	41	1	44	1	47	1	50	1	53	1	56	1	59	2	2	2	5
10	1	36	1	39	1	41	1	44	1	47	1	50	1	53	1	55	1	58	2	1	2	4
20	1	35	1	38	1	40	1	43	1	46	1	49	1	52	1	55	1	58	2	1	2	4
30	1	35	1	38	1	40	1	43	1	46	1	49	1	52	1	54	1	57	2	0	2	3
40	1	35	1	37	1	40	1	42	1	45	1	48	1	51	1	54	1	57	2	0	2	3
50	1	34	1	37	1	39	1	42	1	45	1	48	1	51	1	53	1	56	1	59	2	2
33 0	1	34	1	36	1	39	1	41	1	44	1	47	1	50	1	52	1	55	1	58	2	1
10	1	33	1	36	1	38	1	41	1	44	1	47	1	50	1	52	1	55	1	58	2	1
20	1	33	1	35	1	38	1	40	1	43	1	46	1	49	1	51	1	54	1	57	2	0
30	1	33	1	35	1	38	1	40	1	43	1	46	1	49	1	51	1	54	1	57	2	0
40	1	32	1	34	1	37	1	39	1	42	1	45	1	48	1	50	1	53	1	56	1	59
50	1	32	1	34	1	37	1	39	1	42	1	45	1	48	1	50	1	53	1	56	1	59
34 0	1	31	1	33	1	36	1	38	1	41	1	44	1	47	1	49	1	52	1	55	1	58
10	1	31	1	33	1	36	1	38	1	41	1	44	1	47	1	49	1	52	1	55	1	58
20	1	31	1	33	1	36	1	38	1	41	1	44	1	47	1	49	1	52	1	55	1	58
30	1	30	1	32	1	35	1	37	1	40	1	43	1	46	1	48	1	51	1	54	1	57
40	1	30	1	32	1	35	1	37	1	40	1	43	1	46	1	48	1	51	1	54	1	57
50	1	30	1	32	1	35	1	37	1	40	1	43	1	46	1	48	1	51	1	54	1	57
35 0	1	29	1	31	1	34	1	36	1	39	1	42	1	45	1	47	1	50	1	53	1	56

App. Alt.	Height of the Barometer diminished by one-tenth of the Thermometer.																	
	20		21		22		23		24		25		26		27		28		29		30	
°	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″	′	″
35	1	29	1	31	1	34	1	36	1	39	1	42	1	45	1	47	1	50	1	53	1	56
36	1	27	1	29	1	31	1	34	1	36	1	39	1	42	1	44	1	47	1	50	1	53
37	1	25	1	27	1	29	1	32	1	34	1	37	1	39	1	42	1	44	1	47	1	50
38	1	23	1	25	1	27	1	30	1	32	1	35	1	37	1	40	1	42	1	45	1	48
39	1	21	1	23	1	25	1	28	1	30	1	33	1	35	1	37	1	40	1	42	1	45
40	1	20	1	22	1	24	1	26	1	28	1	31	1	33	1	35	1	38	1	40	1	43
41	1	18	1	20	1	22	1	24	1	26	1	29	1	31	1	33	1	36	1	38	1	41
42	1	16	1	18	1	20	1	22	1	24	1	27	1	29	1	31	1	34	1	36	1	39
43	1	15	1	17	1	19	1	21	1	23	1	26	1	28	1	30	1	32	1	34	1	37
44	1	14	1	16	1	18	1	20	1	22	1	24	1	26	1	28	1	30	1	32	1	35
45	1	13	1	15	1	17	1	19	1	21	1	23	1	25	1	27	1	29	1	31	1	34
46	1	11	1	13	1	15	1	17	1	19	1	21	1	23	1	25	1	27	1	29	1	32
47	1	10	1	12	1	14	1	16	1	18	1	20	1	22	1	24	1	26	1	28	1	31
48	1	9	1	11	1	13	1	15	1	17	1	19	1	21	1	23	1	25	1	27	1	30
49	1	7	1	9	1	11	1	13	1	15	1	17	1	19	1	21	1	23	1	25	1	28
50	1	7	1	8	1	10	1	12	1	14	1	16	1	18	1	20	1	22	1	24	1	26
51	1	6	1	7	1	9	1	11	1	13	1	15	1	17	1	19	1	21	1	23	1	25
52	1	5	1	6	1	8	1	10	1	12	1	14	1	16	1	18	1	20	1	22	1	24
53	1	4	1	5	1	7	1	9	1	11	1	13	1	15	1	17	1	19	1	21	1	23
54	1	3	1	4	1	6	1	8	1	10	1	12	1	14	1	16	1	18	1	20	1	22
55	1	2	1	3	1	5	1	7	1	9	1	11	1	13	1	15	1	16	1	18	1	20
56	1	1	1	2	1	4	1	6	1	8	1	10	1	12	1	14	1	15	1	17	1	19
57	1	1	1	2	1	4	1	6	1	8	1	10	1	12	1	14	1	15	1	17	1	19
58	1	0	1	1	1	3	1	5	1	7	1	9	1	11	1	13	1	14	1	16	1	18
59	1	0	1	1	1	3	1	4	1	6	1	8	1	10	1	12	1	13	1	15	1	17
60	0	59	1	0	1	2	1	3	1	5	1	7	1	9	1	11	1	12	1	14	1	16
61		59	1	0	1	2	1	3	1	5	1	7	1	9	1	11	1	12	1	14	1	16
62		58	0	59	1	1	1	2	1	4	1	6	1	8	1	10	1	11	1	13	1	15
63		58		59	1	1	1	2	1	4	1	6	1	8	1	10	1	11	1	13	1	15
64		57		58	1	0	1	1	1	3	1	5	1	7	1	9	1	10	1	12	1	14
65		56		57	0	59	1	0	1	2	1	4	1	6	1	8	1	9	1	11	1	13
66		56		57		59	1	0	1	2	1	4	1	6	1	8	1	9	1	11	1	13
67		55		56		58	0	59	1	1	1	3	1	5	1	7	1	8	1	10	1	12
68		55		56		58		59	1	1	1	3	1	4	1	6	1	7	1	9	1	11
69		55		56		58		59	1	1	1	3	1	4	1	6	1	7	1	9	1	11
70		54		55		57		58	1	0	1	2	1	3	1	5	1	6	1	8	1	10
71		54		55		57		58	1	0	1	2	1	3	1	5	1	6	1	8	1	10
72		53		54		56		57	0	59	1	1	1	2	1	4	1	5	1	7	1	9
73		53		54		56		57		59	1	1	1	2	1	4	1	5	1	7	1	9
74		53		54		56		57		59	1	1	1	2	1	4	1	5	1	7	1	9
75		53		54		55		57		58	1	0	1	1	1	3	1	4	1	6	1	8
76		53		54		55		57		58	1	0	1	1	1	3	1	4	1	6	1	8
77		53		54		55		57		58	1	0	1	1	1	3	1	4	1	6	1	8
78		53		54		55		57		58	1	0	1	1	1	3	1	4	1	6	1	8
79		53		54		55		57		58	1	0	1	1	1	3	1	4	1	6	1	8
80		52		53		54		56		57	0	59	1	0	1	2	1	3	1	5	1	7
81		52		53		54		56		57		59	1	0	1	2	1	3	1	5	1	7
82		52		53		54		56		57		59	1	0	1	2	1	3	1	5	1	7
83		52		53		54		56		57		59	1	0	1	2	1	3	1	5	1	7
84		52		53		54		56		57		59	1	0	1	2	1	3	1	5	1	7
85		52		53		54		56		57		59	1	0	1	2	1	3	1	5	1	7
86		52		53		54		56		57		59	1	0	1	2	1	3	1	5	1	7
87		52		53		54		56		57		59	1	0	1	2	1	3	1	5	1	7
88		51		52		53		55		56		58	0	59	1	1	1	2	1	4	1	6
89		51		52		53		55		56		58		59	1	1	1	2	1	4	1	6
90		51		52		53		55		56		58		59	1	1	1	2	1	4	1	6

TABLE XIX.—For Correction of Parallax on a Lunar Distance.

Par. in Alt. or Dist.	Apparent Distance.															
	10°	11°	12°	13°	14°	15°	16°	17°	18°	19°	20°	21°	22°	23°	24°	25°
′	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0
8	3	3	3	2	2	2	2	2	2	2	2	1	1	1	1	1
10	5	4	4	4	3	3	3	3	3	3	2	2	2	2	2	2
11	6	5	5	5	4	4	4	3	3	3	3	3	3	2	2	2
12	7	6	6	5	5	5	4	4	4	4	3	3	3	3	3	3
13	8	8	7	6	6	6	5	5	5	4	4	4	4	3	3	3
14	10	9	8	7	7	6	6	6	5	5	5	4	4	4	4	4
15	11	10	9	9	8	7	7	6	6	6	5	5	5	5	4	4
16	13	11	11	10	9	8	8	7	7	6	6	6	6	5	5	5
17	14	13	12	11	10	9	9	8	8	7	7	7	6	6	6	5
18	16	15	13	12	11	11	10	9	9	8	8	7	7	7	6	6
19	18	16	15	14	13	12	11	10	10	9	9	8	8	7	7	7
20	20	18	16	15	14	13	12	11	11	10	10	9	9	8	8	7
21	22	20	18	17	15	14	13	13	12	11	11	10	10	9	9	8
22	24	22	20	18	17	16	15	14	13	12	12	11	10	10	9	9
23	26	24	22	20	19	17	16	15	14	13	13	12	11	11	10	10
24	28	26	24	22	20	19	18	16	15	15	14	13	12	12	11	11
25	31	28	26	24	22	20	19	18	17	16	15	14	13	13	12	12
26	33	30	28	26	24	22	21	19	18	17	16	15	15	14	13	13
27	36	33	30	28	26	24	22	21	20	18	17	17	16	15	14	13
28	39	35	32	30	27	26	24	22	21	20	19	18	17	16	15	15
29	42	38	35	32	29	27	26	24	23	21	20	19	18	17	16	16
30	45	40	37	34	31	29	27	26	24	23	22	20	19	19	18	17
31	48	43	39	36	34	31	29	27	26	24	23	22	21	20	19	18
32	51	46	42	39	36	33	31	29	27	26	25	23	22	21	20	19
33	54	49	45	41	38	35	33	31	29	28	26	25	24	22	21	20
34	57	52	47	44	40	38	35	33	31	29	28	26	25	24	23	22
35	61	55	50	46	43	40	37	35	33	31	29	28	26	25	24	23
36	64	58	53	49	45	42	39	37	35	33	31	29	28	27	25	24
37	68	61	56	52	48	45	42	39	37	35	33	31	30	28	27	26
38	71	65	59	55	51	47	44	41	39	37	35	33	31	30	28	27
39	75	68	62	57	53	50	46	43	41	39	36	35	33	31	30	28
40	79	72	66	60	56	52	49	46	43	41	38	36	35	33	31	30
41	83	75	69	63	59	55	51	48	45	43	40	38	36	35	33	31
42	87	79	72	67	62	57	54	50	47	45	42	40	38	36	35	33
43	91	83	76	70	65	60	56	53	50	47	44	42	40	38	36	35
44	96	87	79	73	68	63	59	55	52	49	46	44	42	40	38	36
45	100	91	83	76	71	66	62	58	54	51	49	46	44	42	40	38
46	105	95	87	80	74	69	64	60	57	54	51	48	46	43	41	40
47	109	99	91	83	77	72	67	63	59	56	53	50	48	45	43	41
48	114	103	94	87	81	75	70	66	62	58	55	52	50	47	45	43
49	119	108	98	91	84	78	73	68	64	61	58	55	52	49	47	45
50	124	112	103	94	87	81	76	71	67	63	60	57	54	51	49	47
51	128	117	107	98	91	85	79	74	70	66	62	59	56	53	51	49
52	134	121	111	102	95	88	82	77	73	68	65	61	58	56	53	51
53	139	126	115	106	98	91	85	80	75	71	67	64	61	58	55	53
54	144	131	120	110	102	95	89	83	78	74	70	66	63	60	57	55
55	149	136	124	114	106	98	92	86	81	77	72	69	65	62	59	57
56	155	141	129	118	110	102	95	89	84	79	75	71	68	64	61	59
57	160	146	133	123	114	106	99	93	87	82	78	74	70	67	64	61
58	166	151	138	127	118	109	102	96	90	85	81	76	73	69	66	63
59	172	156	143	131	122	113	106	99	93	88	83	79	75	72	68	65
60	178	161	148	136	126	117	109	103	97	91	86	82	78	74	71	67
61	184	167	152	140	130	121	113	106	100	94	89	85	80	76	73	70
62	190	172	158	145	134	125	117	110	103	97	92	87	83	79	75	72

Add the Difference of the two Numbers taken out of this Table; if the Apparent Distance is less than 90°, and subtract it if above.

Par. in Alt. or Dist.	Apparent Distance.														
	26°	27°	28°	29°	30°	31°	32°	33°	34°	35°	36°	37°	38°	39°	40°
′	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
10	2	2	2	2	2	1	1	1	1	1	1	1	1	1	1
11	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1
12	3	2	2	2	2	2	2	2	2	2	2	2	2	2	1
13	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2
14	4	3	3	3	3	3	3	3	3	2	2	2	2	2	2
15	4	4	4	4	3	3	3	3	3	3	3	3	3	2	2
16	5	4	4	4	4	4	4	3	3	3	3	3	3	3	3
17	5	5	5	5	4	4	4	4	4	4	3	3	3	3	3
18	6	6	5	5	5	5	5	4	4	4	4	4	4	3	3
19	6	6	6	6	5	5	5	5	5	4	4	4	4	4	4
20	7	7	7	6	6	6	6	5	5	5	5	5	4	4	4
21	8	8	7	7	7	6	6	6	6	5	5	5	5	5	5
22	9	8	8	8	7	7	7	7	6	6	6	6	5	5	5
23	9	9	9	8	8	8	7	7	7	7	6	6	6	6	6
24	10	10	9	9	9	8	8	8	7	7	7	7	6	6	6
25	11	11	10	10	9	9	9	8	8	8	8	7	7	7	6
26	12	12	11	11	10	10	9	9	9	8	8	8	8	7	7
27	13	12	12	11	11	11	10	10	9	9	9	8	8	8	8
28	14	13	13	12	12	11	11	11	10	10	9	9	9	8	8
29	15	14	14	13	13	12	12	11	11	10	10	10	9	9	9
30	16	15	15	14	14	13	13	12	12	11	11	10	10	10	9
31	17	16	16	15	15	14	13	13	12	12	12	11	11	10	10
32	18	18	17	16	15	15	14	14	13	13	12	12	11	11	11
33	19	19	18	17	16	16	15	15	14	14	13	13	12	12	11
34	21	20	19	18	17	17	16	16	15	14	14	13	13	12	12
35	22	21	20	19	19	18	17	16	16	15	15	14	14	13	13
36	23	22	21	20	20	19	18	17	17	61	16	15	14	14	13
37	24	23	22	22	21	20	19	18	18	17	16	16	15	15	14
38	26	25	24	23	22	21	20	19	19	18	17	17	16	16	15
39	27	26	25	24	23	22	21	20	20	19	18	18	17	16	16
40	29	27	26	25	24	23	22	21	21	20	19	19	18	17	17
41	30	29	28	26	25	24	23	23	22	21	20	19	19	18	17
42	32	30	29	28	27	26	25	24	23	22	21	20	20	19	18
43	33	32	30	29	28	27	26	25	24	23	22	21	21	20	19
44	35	33	32	30	29	28	27	26	25	24	23	22	22	21	20
45	36	35	33	32	31	29	28	27	26	25	24	23	23	22	21
46	38	36	35	33	32	31	30	28	27	26	25	25	24	23	22
47	40	38	36	35	33	32	31	30	29	28	27	26	25	24	23
48	41	39	38	36	35	33	32	31	30	29	28	27	26	25	24
49	43	41	39	38	36	35	34	32	31	30	29	28	27	26	25
50	45	43	41	39	38	36	35	34	32	31	30	29	28	27	26
51	47	45	43	41	39	38	36	35	34	32	31	30	29	28	27
52	48	46	44	43	41	39	38	36	35	34	32	31	30	29	28
53	50	48	46	44	42	41	39	38	36	35	34	33	31	30	29
54	52	50	48	46	44	42	41	39	38	36	35	34	33	31	30
55	54	52	50	48	46	44	42	41	39	38	36	35	34	33	31
56	56	54	51	49	47	46	44	42	41	39	38	36	35	34	33
57	58	56	53	51	49	47	45	44	42	40	39	38	36	35	34
58	60	58	55	53	51	49	47	45	44	42	40	39	38	36	35
59	62	60	57	55	53	51	49	47	45	43	42	40	39	38	36
60	64	62	59	57	54	52	50	48	47	45	43	42	40	39	37
61	67	64	61	59	56	54	52	50	48	46	45	43	42	40	39
62	69	66	63	60	58	56	54	52	50	48	46	45	43	41	40

Add the Difference of the two Numbers taken out of this Table, if the Apparent Distance is less than 90°, and subtract it if above.

TABLE XIX.—For Correction of Parallax on a Lunar Distance.

Par. in Alt. or Dist.	Apparent Distance.															
	41°	42°	43°	44°	45°	46°	47°	48°	49°	50°	51°	52°	53°	54°	55°	56°
′	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
10	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
11	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
13	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1
14	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1	1
15	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1
16	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
17	3	3	3	3	3	2	2	2	2	2	2	2	2	2	2	2
18	3	3	3	3	3	3	3	3	2	2	2	2	2	2	2	2
19	4	3	3	3	3	3	3	3	3	3	3	2	2	2	2	2
20	4	4	4	4	3	3	3	3	3	3	3	3	3	3	2	2
21	4	4	4	4	4	4	4	3	3	3	3	3	3	3	3	3
22	5	5	5	4	4	4	4	4	4	4	3	3	3	3	3	3
23	5	5	5	5	5	4	4	4	4	4	4	4	3	3	3	3
24	6	6	5	5	5	5	5	5	4	4	4	4	4	4	4	3
25	6	6	6	6	5	5	5	5	5	5	4	4	4	4	4	4
26	7	7	6	6	6	6	6	5	5	5	5	5	4	4	4	4
27	7	7	7	7	6	6	6	6	6	5	5	5	5	5	4	4
28	8	8	7	7	7	7	6	6	6	6	6	5	5	5	5	5
29	8	8	8	8	7	7	7	7	6	6	6	6	6	5	5	5
30	9	9	8	8	8	8	7	7	7	7	6	6	6	6	5	5
31	10	9	9	9	8	8	8	8	7	7	7	7	6	6	6	6
32	10	10	10	9	9	9	8	8	8	7	7	7	7	6	6	6
33	11	11	10	10	10	9	9	9	8	8	8	7	7	7	7	6
34	12	11	11	10	10	10	9	9	9	8	8	8	8	7	7	7
35	12	12	11	11	11	10	10	10	9	9	9	8	8	8	7	7
36	13	13	12	12	11	11	11	10	10	9	9	9	9	8	8	8
37	14	13	13	12	12	12	11	11	10	10	10	9	9	9	8	8
38	14	14	14	13	13	12	12	11	11	11	10	10	9	9	9	8
39	15	15	14	14	13	13	12	12	12	11	11	10	10	10	9	9
40	16	16	15	14	14	13	13	13	12	12	11	11	11	10	10	9
41	17	16	16	15	15	14	14	13	13	12	12	11	11	11	10	10
42	18	17	17	16	15	15	14	14	13	13	12	12	12	11	11	10
43	19	18	17	17	16	16	15	15	14	14	13	13	12	12	11	11
44	19	19	18	17	17	16	16	15	15	14	14	13	13	12	12	11
45	20	20	19	18	18	17	16	16	15	15	14	14	13	13	12	12
46	21	21	20	19	18	18	17	17	16	15	15	14	14	13	13	12
47	22	21	21	20	19	19	18	17	17	16	16	15	15	14	13	13
48	23	22	22	21	20	19	19	18	17	17	16	16	15	15	14	14
49	24	23	22	22	21	20	20	19	18	18	17	16	16	15	15	14
50	25	24	23	23	22	21	20	20	19	18	18	17	16	16	15	15
51	26	25	24	24	23	22	21	20	20	19	18	18	17	16	16	15
52	27	26	25	24	24	23	22	21	21	20	19	18	18	17	17	16
53	28	27	26	25	25	24	23	22	21	21	20	19	18	18	17	17
54	29	28	27	26	25	25	24	23	22	21	21	20	19	18	18	17
55	30	29	28	27	26	25	25	24	23	22	21	21	20	19	18	18
56	31	30	29	28	27	26	26	25	24	23	22	21	21	20	19	18
57	33	31	30	29	28	27	26	26	25	24	23	22	21	21	20	19
58	34	33	31	30	29	28	27	26	26	25	24	23	22	21	21	20
59	35	34	33	31	30	29	28	27	26	25	25	24	23	22	21	20
60	36	35	34	33	31	30	29	28	27	26	25	25	24	23	22	21
61	37	36	35	34	32	31	30	29	28	27	26	25	24	24	23	22
62	39	37	36	35	34	32	31	30	29	28	27	26	25	24	23	23

Add the Difference of the two Numbers taken out of this Table, if the apparent Distance is less than 90°, and subtract it if above.

Par. in Alt. or Dist.	Apparent Distance.															
	57°	58°	59°	60°	65°	70°	75°	80°	85°	90°	95°	100°	105°	110°	115°	120°
′	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″	″
5	0	0	0	0	0	0	0	0	0	0	20	20	20	20	20	20
8	0	0	0	0	0	0	0	0	0	0	20	20	20	20	20	20
10	1	1	1	1	0	0	0	0	0	0	20	20	20	20	20	19
11	1	1	1	1	0	0	0	0	0	0	20	20	20	20	20	19
12	1	1	1	1	1	0	0	0	0	0	20	20	20	20	19	19
13	1	1	1	1	1	1	0	0	0	0	20	20	20	19	19	19
14	1	1	1	1	1	1	0	0	0	0	20	20	20	19	19	19
15	1	1	1	1	1	1	1	0	0	0	20	20	19	19	19	19
16	1	1	1	1	1	1	1	0	0	0	20	20	19	19	19	19
17	2	2	2	1	1	1	1	0	0	0	20	20	19	19	19	19
18	2	2	2	2	1	1	1	0	0	0	20	20	19	19	19	18
19	2	2	2	2	1	1	1	1	0	0	20	19	19	19	19	18
20	2	2	2	2	2	1	1	1	0	0	20	19	19	19	18	18
21	2	2	2	2	2	1	1	1	0	0	20	19	19	19	18	18
22	3	3	3	2	2	2	1	1	0	0	20	19	19	18	18	18
23	3	3	3	3	2	2	1	1	0	0	20	19	19	18	18	17
24	3	3	3	3	2	2	1	1	0	0	20	19	19	18	18	17
25	4	3	3	3	3	2	1	1	0	0	20	19	19	18	17	17
26	4	4	4	3	3	2	2	1	1	0	19	19	18	18	17	17
27	4	4	4	4	3	2	2	1	1	0	19	19	18	18	17	16
28	4	4	4	4	3	2	2	1	1	0	19	19	18	18	17	16
29	5	5	4	4	3	3	2	1	1	0	19	19	18	17	17	16
30	5	5	5	5	4	3	2	1	1	0	19	19	18	17	16	15
31	5	5	5	5	4	3	2	1	1	0	19	19	18	17	16	15
32	6	6	5	5	4	3	2	2	1	0	19	18	18	17	16	15
33	6	6	6	5	4	3	3	2	1	0	19	18	17	17	16	15
34	7	6	6	6	5	4	3	2	1	0	19	18	17	16	15	14
35	7	7	6	6	5	4	3	2	1	0	19	18	17	16	15	14
36	7	7	7	7	5	4	3	2	1	0	19	18	17	16	15	13
37	8	7	7	7	6	4	3	2	1	0	19	18	17	16	14	13
38	8	8	8	7	6	5	3	2	1	0	19	18	17	15	14	13
39	9	8	8	8	6	5	4	2	1	0	19	18	16	15	14	12
40	9	9	8	8	7	5	4	2	1	0	19	18	16	15	13	12
41	10	9	9	8	7	5	4	3	1	0	19	17	16	15	13	12
42	10	10	9	9	7	6	4	3	1	0	19	17	16	14	13	11
43	10	10	10	9	8	6	4	3	1	0	19	17	16	14	12	11
44	11	11	10	10	8	6	5	3	1	0	19	17	15	14	12	10
45	11	11	11	10	8	6	5	3	2	0	18	17	15	14	12	10
46	12	12	11	11	9	7	5	3	2	0	18	17	15	13	11	9
47	13	12	12	11	9	7	5	3	2	0	18	17	15	13	11	9
48	13	13	12	12	9	7	5	4	2	0	18	16	15	13	11	8
49	14	13	13	12	10	8	6	4	2	0	18	16	14	12	10	8
50	14	14	13	13	10	8	6	4	2	0	18	16	14	12	10	7
51	15	14	14	13	11	8	6	4	2	0	18	16	14	12	9	7
52	15	15	14	14	11	9	6	4	2	0	18	16	14	11	9	6
53	16	15	15	14	11	9	7	4	2	0	18	16	13	11	9	6
54	17	16	15	15	12	9	7	4	2	0	18	16	13	11	8	5
55	17	16	16	15	12	10	7	5	2	0	18	15	13	10	8	5
56	18	17	16	16	13	10	7	5	2	0	18	15	13	10	7	4
57	18	18	17	16	13	10	8	5	2	0	18	15	12	10	7	4
58	19	18	18	17	14	11	8	5	3	0	17	15	12	9	6	3
59	20	19	18	18	14	11	8	5	3	0	17	15	12	9	6	2
60	20	20	19	18	15	11	8	6	3	0	17	14	12	9	5	2
61	21	20	20	19	15	12	9	6	3	0	17	14	11	8	5	1
62	22	21	20	19	16	12	9	6	3	0	17	14	11	8	4	1

Add the Difference of the two Numbers taken out of this Table, if the apparent Distance is less than 90°, and subtract it if above.

TABLE XX.—Semidiurnal Arcs, for each degree of Latitude.

(Allowing for Refraction.)

Latitude of the *same* Name as the Declination.

Dec.	1°		2°		3°		4°		5°		6°		7°		8°		9°		10°		11°		12°	
°	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.
1	6	2	6	2	6	2	6	2	6	2	6	3	6	3	6	3	6	3	6	3	6	3	6	3
2	6	2	6	2	6	3	6	3	6	3	6	3	6	3	6	3	6	3	6	4	6	4	6	4
3	6	2	6	3	6	3	6	3	6	3	6	3	6	4	6	4	6	4	6	4	6	4	6	5
4	6	2	6	3	6	3	6	3	6	4	6	4	6	4	6	4	6	5	6	5	6	5	6	6
5	6	2	6	3	6	3	6	4	6	4	6	4	6	5	6	5	6	5	6	6	6	6	6	6
6	6	3	6	3	6	3	6	4	6	4	6	4	6	5	6	6	6	6	6	6	6	7	6	7
7	6	3	6	3	6	4	6	4	6	5	6	5	6	6	6	6	6	7	6	7	6	8	6	8
8	6	3	6	3	6	4	6	4	6	5	6	5	6	6	6	7	6	7	6	8	6	8	6	9
9	6	3	6	3	6	4	6	4	6	5	6	6	6	7	6	7	6	8	6	9	6	9	6	10
10	6	3	6	4	6	4	6	5	6	6	6	6	6	7	6	8	6	9	6	9	6	10	6	11
11	6	3	6	4	6	4	6	5	6	6	6	7	6	8	6	8	6	9	6	10	6	11	6	12
12	6	3	6	4	6	5	6	6	6	6	6	7	6	8	6	9	6	10	6	11	6	12	6	13
13	6	3	6	4	6	5	6	6	6	7	6	8	6	9	6	10	6	11	6	12	6	12	6	13
14	6	3	6	4	6	5	6	6	6	7	6	8	6	9	6	10	6	11	6	12	6	13	6	14
15	6	3	6	4	6	5	6	6	6	8	6	9	6	10	6	11	6	12	6	13	6	14	6	15
16	6	3	6	4	6	6	6	7	6	8	6	9	6	10	6	11	6	13	6	14	6	15	6	16
17	6	3	6	5	6	6	6	7	6	8	6	10	6	11	6	12	6	13	6	15	6	16	6	17
18	6	4	6	5	6	6	6	7	6	9	6	10	6	11	6	13	6	14	6	15	6	17	6	18
19	6	4	6	5	6	6	6	8	6	9	6	11	6	12	6	13	6	15	6	16	6	18	6	19
20	6	4	6	5	6	7	6	8	6	9	6	11	6	12	6	14	6	15	6	17	6	19	6	20
21	6	4	6	5	6	7	6	8	6	10	6	12	6	13	6	15	6	16	6	18	6	19	6	21
22	6	4	6	6	6	7	6	8	6	10	6	12	6	14	6	15	6	17	6	19	6	20	6	22
23	6	4	6	6	6	7	6	9	6	11	6	13	6	14	6	16	6	18	6	19	6	21	6	23
24	6	4	6	6	6	8	6	9	6	11	6	13	6	15	6	17	6	19	6	20	6	22	6	24
25	6	4	6	6	6	8	6	10	6	12	6	14	6	15	6	17	6	19	6	21	6	23	6	25
26	6	4	6	6	6	8	6	10	6	12	6	14	6	16	6	18	6	20	6	22	6	24	6	26
27	6	4	6	6	6	8	6	11	6	13	6	15	6	17	6	19	6	21	6	23	6	25	6	27
28	6	5	6	7	6	9	6	11	6	13	6	15	6	17	6	20	6	22	6	24	6	26	6	28
29	6	5	6	7	6	9	6	11	6	14	6	16	6	18	6	20	6	23	6	25	6	27	6	30

Latitude of a *different* Name from the Declination.

Dec.	1°		2°		3°		4°		5°		6°		7°		8°		9°		10°		11°		12°	
°	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.
1	6	2	6	2	6	2	6	2	6	2	6	2	6	2	6	1	6	1	6	1	6	1	6	1
2	6	2	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	0
3	6	2	6	1	6	1	6	1	6	1	6	1	6	1	6	0	6	0	6	0	6	0	6	0
4	6	2	6	1	6	1	6	1	6	1	6	0	6	0	6	0	6	0	5	59	5	59	5	59
5	6	2	6	1	6	1	6	1	6	0	6	0	6	0	5	59	5	59	5	59	5	58	5	58
6	6	2	6	1	6	1	6	0	6	0	6	0	6	0	5	59	5	58	5	58	5	57	5	57
7	6	2	6	1	6	1	6	0	6	0	5	59	5	59	5	58	5	58	5	57	5	57	5	56
8	6	1	6	1	6	0	6	0	5	59	5	59	5	58	5	57	5	57	5	56	5	56	5	55
9	6	1	6	1	6	0	6	0	5	59	5	58	5	57	5	56	5	57	5	56	5	55	5	54
10	6	1	6	1	6	0	5	59	5	59	5	58	5	57	5	56	5	56	5	55	5	54	5	54
11	6	1	6	1	6	0	5	59	5	58	5	57	5	56	5	56	5	55	5	54	5	54	5	53
12	6	1	6	1	6	0	5	59	5	58	5	57	5	56	5	55	5	54	5	54	5	53	5	52
13	6	1	6	0	5	59	5	58	5	57	5	57	5	56	5	55	5	54	5	53	5	52	5	51
14	6	1	6	0	5	59	5	58	5	57	5	56	5	55	5	54	5	53	5	52	5	51	5	50
15	6	1	6	0	5	59	5	58	5	57	5	56	5	55	5	54	5	52	5	51	5	50	5	49
16	6	1	6	0	5	59	5	58	5	56	5	55	5	54	5	53	5	52	5	51	5	49	5	48
17	6	1	6	0	5	59	5	57	5	56	5	55	5	54	5	52	5	51	5	50	5	49	5	47
18	6	1	6	0	5	58	5	57	5	56	5	54	5	53	5	52	5	50	5	49	5	48	5	46
19	6	1	5	59	5	58	5	57	5	55	5	54	5	53	5	51	5	50	5	48	5	47	5	45
20	6	1	5	59	5	58	5	56	5	55	5	53	5	52	5	51	5	49	5	48	5	46	5	45
21	6	1	5	59	5	58	5	56	5	55	5	53	5	52	5	50	5	48	5	47	5	45	5	44
22	6	1	5	59	5	57	5	56	5	54	5	53	5	51	5	49	5	48	5	46	5	44	5	43
23	6	1	5	59	5	57	5	55	5	54	5	52	5	51	5	49	5	47	5	45	5	43	5	42
24	6	1	5	59	5	57	5	55	5	53	5	52	5	50	5	48	5	46	5	44	5	42	5	41
25	6	1	5	59	5	57	5	55	5	53	5	51	5	49	5	47	5	45	5	43	5	42	5	40
26	6	0	5	58	5	56	5	55	5	53	5	51	5	49	5	47	5	45	5	43	5	41	5	39
27	6	0	5	58	5	56	5	54	5	52	5	50	5	48	5	46	5	44	5	42	5	40	5	38
28	6	0	5	58	5	56	5	54	5	52	5	50	5	48	5	45	5	43	5	41	5	39	5	37
29	6	0	5	58	5	56	5	54	5	51	5	49	5	47	5	45	5	42	5	40	5	38	5	36

TABLE XX.—Semidiurnal Arcs, for each degree of Latitude.

(Allowing for Refraction.)

Latitude of the *same* Name as the Declination.

Dec.	13°		14°		15°		16°		17°		18°		19°		20°		21°		22°		23°		24°	
°	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.
1	6	3	6	3	6	3	6	3	6	3	6	4	6	4	6	4	6	4	6	4	6	4	6	4
2	6	4	6	4	6	4	6	4	6	5	6	5	6	5	6	5	6	5	6	6	6	6	6	6
3	6	5	6	5	6	5	6	6	6	6	6	6	6	6	6	7	6	7	6	7	6	7	6	8
4	6	6	6	6	6	6	6	7	6	7	6	7	6	8	6	8	6	8	6	8	6	9	6	9
5	6	7	6	7	6	8	6	8	6	8	6	9	6	9	6	9	6	10	6	10	6	11	6	11
6	6	8	6	8	6	9	6	9	6	10	6	10	6	11	6	11	6	12	6	12	6	13	6	13
7	6	9	6	9	6	10	6	10	6	11	6	11	6	12	6	12	6	13	6	14	6	14	6	15
8	6	10	6	10	6	11	6	11	6	12	6	13	6	13	6	14	6	15	6	15	6	16	6	17
9	6	11	6	11	6	12	6	13	6	13	6	14	6	15	6	15	6	16	6	17	6	18	6	19
10	6	12	6	12	6	13	6	14	6	15	6	15	6	16	6	17	6	18	6	19	6	19	6	20
11	6	13	6	13	6	14	6	15	6	16	6	17	6	18	6	19	6	19	6	20	6	21	6	22
12	6	14	6	14	6	15	6	16	6	17	6	18	6	19	6	20	6	21	6	22	6	23	6	24
13	6	15	6	15	6	16	6	17	6	18	6	19	6	21	6	22	6	23	6	24	6	25	6	26
14	6	15	6	16	6	18	6	19	6	20	6	21	6	22	6	23	6	24	6	25	6	27	6	28
15	6	16	6	18	6	19	6	20	6	21	6	22	6	23	6	25	6	26	6	27	6	28	6	30
16	6	17	6	19	6	20	6	21	6	22	6	24	6	25	6	26	6	28	6	29	6	30	6	32
17	6	18	6	20	6	21	6	22	6	24	6	25	6	27	6	28	6	29	6	31	6	32	6	34
18	6	19	6	21	6	22	6	24	6	25	6	27	6	28	6	30	6	31	6	33	6	34	6	36
19	6	21	6	22	6	23	6	25	6	27	6	28	6	30	6	31	6	33	6	34	6	36	6	38
20	6	22	6	23	6	25	6	26	6	28	6	30	6	31	6	33	6	35	6	36	6	38	6	40
21	6	23	6	24	6	26	6	28	6	29	6	31	6	33	6	35	6	36	6	38	6	40	6	42
22	6	24	6	25	6	27	6	29	6	31	6	33	6	34	6	36	6	38	6	40	6	42	6	44
23	6	25	6	27	6	28	6	30	6	32	6	34	6	36	6	38	6	40	6	42	6	44	6	46
24	6	26	6	28	6	30	6	32	6	34	6	36	6	38	6	40	6	42	6	44	6	46	6	48
25	6	27	6	29	6	31	6	33	6	35	6	37	6	39	6	42	6	44	6	46	6	48	6	51
26	6	28	6	30	6	32	6	35	6	37	6	39	6	41	6	43	6	46	6	48	6	50	6	53
27	6	29	6	32	6	34	6	36	6	38	6	41	6	43	6	45	6	48	6	50	6	53	6	55
28	6	31	6	33	6	35	6	38	6	40	6	42	6	45	6	47	6	50	6	52	6	55	6	57
29	6	32	6	34	6	37	6	39	6	42	6	44	6	47	6	49	6	52	6	54	6	57	7	0

Latitude of a *different* Name from the Declination.

Dec.	13°		14°		15°		16°		17°		18°		19°		20°		21°		22°		23°		24°	
°	h.	m	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m	h.	m.	h.	m.	h.	m.	h.	m.
1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1	6	1
2	6	0	6	0	6	0	6	0	6	0	6	0	5	59	5	59	5	59	5	59	5	59	5	59
3	5	59	5	59	5	59	5	59	5	59	5	58	5	58	5	58	5	58	5	57	5	57	5	57
4	5	59	5	58	5	58	5	58	5	57	5	57	5	57	5	56	5	56	5	56	5	55	5	55
5	5	57	5	57	5	57	5	56	5	56	5	56	5	55	5	55	5	55	5	54	5	54	5	53
6	5	57	5	56	5	56	5	55	5	55	5	54	5	54	5	53	5	53	5	53	5	52	5	52
7	5	56	5	55	5	55	5	54	5	54	5	53	5	53	5	52	5	51	5	51	5	50	5	50
8	5	55	5	54	5	54	5	53	5	52	5	52	5	51	5	51	5	51	5	50	5	49	5	48
9	5	54	5	53	5	52	5	52	5	51	5	50	5	50	5	49	5	48	5	48	5	47	5	46
10	5	53	5	52	5	51	5	51	5	50	5	49	5	48	5	48	5	47	5	46	5	45	5	44
11	5	52	5	51	5	50	5	49	5	49	5	48	5	47	5	46	5	45	5	44	5	43	5	42
12	5	51	5	50	5	49	5	48	5	47	5	46	5	45	5	45	5	44	5	43	5	42	5	41
13	5	50	5	49	5	48	5	47	5	46	5	45	5	44	5	43	5	42	5	41	5	40	5	39
14	5	49	5	48	5	47	5	46	5	45	5	44	5	43	5	41	5	40	5	39	5	38	5	37
15	5	48	5	47	5	46	5	45	5	43	5	42	5	41	5	40	5	39	5	38	5	36	5	35
16	5	47	5	46	5	45	5	43	5	42	5	41	5	40	5	38	5	37	5	36	5	34	5	33
17	5	46	5	45	5	43	5	42	5	41	5	40	5	38	5	37	5	35	5	34	5	33	5	31
18	5	45	5	44	5	42	5	41	5	40	5	38	5	37	5	35	5	34	5	32	5	31	5	29
19	5	44	5	43	5	41	5	40	5	38	5	37	5	35	5	34	5	32	5	30	5	29	5	27
20	5	43	5	41	5	40	5	38	5	37	5	35	5	34	5	32	5	30	5	29	5	27	5	25
21	5	42	5	40	5	39	5	37	5	35	5	34	5	32	5	30	5	28	5	27	5	25	5	23
22	5	41	5	39	5	38	5	36	5	34	5	32	5	30	5	29	5	27	5	25	5	23	5	21
23	5	40	5	38	5	36	5	34	5	33	5	31	5	29	5	27	5	25	5	23	5	21	5	19
24	5	39	5	37	5	35	5	33	5	31	5	29	5	27	5	25	5	23	5	21	5	19	5	17
25	5	38	5	36	5	34	5	32	5	30	5	28	5	26	5	24	5	21	5	19	5	17	5	15
26	5	37	5	34	5	32	5	30	5	28	5	26	5	24	5	22	5	19	5	17	5	15	5	12
27	5	36	5	33	5	31	5	29	5	26	5	24	5	22	5	20	5	17	5	15	5	13	5	10
28	5	34	5	32	5	30	5	27	5	25	5	22	5	21	5	18	5	15	5	13	5	10	5	8
29	5	33	5	31	5	28	5	26	5	24	5	21	5	19	5	16	5	13	5	11	5	8	5	6

TABLE XX.—Semidiurnal Arcs, for each degree of Latitude.

(Allowing for Refraction.)

Dec.	Latitude of the *same* Name as the Declination.											
	25°	26°	27°	28°	29°	30°	31°	32°	33°	34°	35°	36°
°	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	6 4	6 4	6 4	6 5	6 5	6 5	6 5	6 5	6 5	6 5	6 5	6 6
2	6 6	6 6	6 6	6 7	6 7	6 7	6 7	6 7	6 8	6 8	6 8	6 8
3	6 8	6 8	6 8	6 9	6 9	6 9	6 10	6 10	6 10	6 11	6 11	6 11
4	6 10	6 10	6 11	6 11	6 11	6 11	6 12	6 12	6 13	6 13	6 14	6 14
5	6 12	6 12	6 13	6 13	6 14	6 14	6 15	6 15	6 16	6 16	6 17	6 17
6	6 14	6 14	6 15	6 15	6 16	6 16	6 17	6 18	6 18	6 19	6 19	6 20
7	6 15	6 16	6 17	6 17	6 18	6 19	6 19	6 20	6 21	6 22	6 22	6 24
8	6 17	6 18	6 19	6 20	6 20	6 21	6 22	6 23	6 23	6 24	6 25	6 26
9	6 19	6 20	6 21	6 22	6 23	6 23	6 24	6 25	6 26	6 27	6 28	6 29
10	6 21	6 22	6 23	6 24	6 25	6 26	6 27	6 28	6 29	6 30	6 31	6 32
11	6 23	6 24	6 25	6 26	6 27	6 28	6 29	6 30	6 32	6 33	6 34	6 35
12	6 25	6 26	6 27	6 28	6 30	6 31	6 32	6 33	6 34	6 36	6 37	6 38
13	6 27	6 28	6 30	6 31	6 32	6 33	6 34	6 36	6 37	6 38	6 40	6 41
14	6 29	6 30	6 32	6 33	6 34	6 36	6 37	6 38	6 40	6 41	6 43	6 44
15	6 31	6 32	6 34	6 35	6 37	6 38	6 40	6 41	6 43	6 44	6 46	6 48
16	6 33	6 35	6 36	6 38	6 39	6 41	6 42	6 44	6 46	6 47	6 49	6 51
17	6 35	6 37	6 38	6 40	6 42	6 43	6 45	6 47	6 48	6 50	6 52	6 54
18	6 37	6 39	6 41	6 42	6 44	6 46	6 48	6 50	6 51	6 53	6 55	6 57
19	6 39	6 41	6 43	6 45	6 47	6 48	6 50	6 52	6 54	6 56	6 59	7 1
20	6 42	6 43	6 45	6 47	6 49	6 51	6 53	6 55	6 57	7 0	7 2	7 4
21	6 44	6 46	6 48	6 50	6 52	6 54	6 56	6 58	7 0	7 3	7 5	7 8
22	6 46	6 48	6 50	6 52	6 54	6 57	6 59	7 1	7 4	7 6	7 9	7 11
23	6 48	6 50	6 53	6 55	6 57	6 59	7 2	7 4	7 7	7 9	7 12	7 15
24	6 51	6 53	6 55	6 57	7 0	7 2	7 5	7 7	7 10	7 13	7 16	7 19
25	6 53	6 55	6 58	7 0	7 3	7 5	7 8	7 11	7 13	7 16	7 19	7 22
26	6 55	6 58	7 0	7 3	7 6	7 8	7 11	7 14	7 17	7 20	7 23	7 26
27	6 58	7 0	7 3	7 6	7 8	7 11	7 14	7 17	7 20	7 23	7 27	7 30
28	7 0	7 3	7 6	7 8	7 11	7 14	7 17	7 21	7 24	7 27	7 31	7 34
29	7 3	7 6	7 9	7 11	7 14	7 18	7 21	7 24	7 28	7 31	7 35	7 38

Dec.	Latitude of a *different* Name from the Declination.											
	25°	26°	27°	28°	29°	30°	31°	32°	33°	34°	35°	36°
°	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0	6 0
2	5 59	5 58	5 58	5 58	5 58	5 58	5 58	5 57	5 57	5 57	5 57	5 57
3	5 57	5 56	5 56	5 56	5 56	5 55	5 55	5 55	5 55	5 54	5 54	5 54
4	5 55	5 55	5 54	5 54	5 54	5 53	5 53	5 52	5 52	5 52	5 51	5 51
5	5 53	5 53	5 52	5 52	5 51	5 51	5 50	5 50	5 49	5 49	5 49	5 48
6	5 51	5 51	5 50	5 50	5 49	5 49	5 48	5 47	5 47	5 46	5 46	5 45
7	5 49	5 49	5 48	5 47	5 47	5 46	5 46	5 45	5 44	5 44	5 43	5 42
8	5 47	5 47	5 46	5 45	5 45	5 44	5 43	5 43	5 42	5 41	5 40	5 39
9	5 45	5 45	5 44	5 43	5 42	5 41	5 41	5 40	5 39	5 38	5 37	5 36
10	5 43	5 43	5 42	5 41	5 40	5 39	5 38	5 37	5 36	5 35	5 34	5 33
11	5 42	5 41	5 40	5 39	5 38	5 37	5 36	5 35	5 34	5 32	5 31	5 30
12	5 40	5 39	5 38	5 36	5 36	5 35	5 34	5 32	5 31	5 30	5 28	5 27
13	5 38	5 37	5 36	5 34	5 33	5 32	5 31	5 29	5 28	5 27	5 25	5 24
14	5 36	5 34	5 33	5 32	5 31	5 29	5 28	5 27	5 25	5 24	5 22	5 21
15	5 34	5 32	5 31	5 30	5 28	5 27	5 26	5 24	5 23	5 21	5 19	5 18
16	5 32	5 30	5 29	5 27	5 26	5 24	5 23	5 21	5 20	5 18	5 16	5 15
17	5 30	5 28	5 26	5 25	5 24	5 22	5 20	5 19	5 17	5 15	5 13	5 11
18	5 28	5 26	5 24	5 23	5 21	5 19	5 18	5 16	5 14	5 12	5 10	5 8
19	5 26	5 24	5 22	5 21	5 19	5 17	5 15	5 13	5 11	5 9	5 7	5 5
20	5 24	5 22	5 20	5 18	5 16	5 14	5 12	5 10	5 8	5 6	5 4	5 2
21	5 21	5 19	5 17	5 15	5 13	5 11	5 9	5 7	5 5	5 3	5 1	4 58
22	5 19	5 17	5 15	5 13	5 11	5 9	5 7	5 4	5 2	5 0	4 57	4 55
23	5 17	5 15	5 13	5 10	5 8	5 6	5 4	5 1	4 59	4 56	4 54	4 51
24	5 15	5 12	5 10	5 8	5 6	5 3	5 1	4 58	4 56	4 53	4 50	4 48
25	5 12	5 10	5 8	5 5	5 3	5 0	4 58	4 55	4 52	4 50	4 47	4 44
26	5 10	5 8	5 5	5 3	5 0	4 57	4 55	4 52	4 49	4 46	4 43	4 40
27	5 8	5 5	5 3	5 0	4 57	4 54	4 52	4 49	4 46	4 43	4 39	4 36
28	5 5	5 3	5 0	4 57	4 54	4 51	4 48	4 55	4 42	4 39	4 36	4 32
29	5 3	5 0	4 57	4 54	4 51	4 48	4 45	4 42	4 39	4 35	4 32	4 28

TABLE XX.—Semidiurnal Arcs, for each degree of Latitude.

(Allowing for Refraction.)

Dec.	Latitude of the *same* Name as the Declination.																							
	37°		38°		39°		40°		41°		42°		43°		44°		45°		46°		47°		48°	
0	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.
1	6	6	6	6	6	6	6	6	6	6	6	6	6	7	6	7	6	7	6	7	6	7	6	8
2	6	9	6	9	6	9	6	9	6	10	6	10	6	10	6	11	6	11	6	11	6	12	6	12
3	6	12	6	12	6	12	6	13	6	13	6	14	6	14	6	15	6	15	6	15	6	16	6	17
4	6	15	6	15	6	16	6	16	6	17	6	17	6	18	6	18	6	19	6	20	6	20	6	21
5	6	18	6	18	6	19	6	20	6	20	6	21	6	22	6	22	6	23	6	24	6	25	6	25
6	6	21	6	22	6	22	6	23	6	24	6	25	6	25	6	26	6	27	6	28	6	29	6	30
7	6	24	6	25	6	26	6	26	6	27	6	28	6	29	6	30	6	31	6	32	6	33	6	34
8	6	27	6	28	6	29	6	30	6	31	6	32	6	33	6	34	6	35	6	37	6	38	6	39
9	6	30	6	31	6	32	6	33	6	35	6	36	6	37	6	38	6	40	6	41	6	42	6	44
10	6	33	6	34	6	36	6	37	6	38	6	39	6	41	6	42	6	44	6	45	6	47	6	48
11	6	36	6	38	6	39	6	40	6	42	6	43	6	45	6	46	6	48	6	50	6	51	6	53
12	6	40	6	41	6	42	6	44	6	45	6	47	6	49	6	50	6	52	6	55	6	56	6	58
13	6	43	6	44	6	46	6	48	6	49	6	51	6	53	6	55	6	47	6	59	7	1	7	3
14	6	46	6	48	6	49	6	51	6	53	6	55	6	57	6	59	7	1	7	3	7	5	7	8
15	6	49	6	51	6	53	6	55	6	57	6	59	7	1	7	3	7	5	7	8	7	10	7	13
16	6	53	6	55	6	57	6	59	7	1	7	3	7	5	7	7	7	10	7	12	7	15	7	18
17	6	56	6	58	7	0	7	2	7	5	7	7	7	9	7	12	7	14	7	17	7	20	7	23
18	7	0	7	2	7	4	7	6	7	9	7	11	7	14	7	16	7	19	7	22	7	25	7	28
19	7	3	7	5	7	8	7	10	7	13	7	15	7	18	7	21	7	24	7	27	7	30	7	34
20	7	7	7	9	7	12	7	14	7	17	7	20	7	23	7	26	7	29	7	32	7	35	7	39
21	7	10	7	13	7	15	7	18	7	21	7	24	7	27	7	30	7	34	7	37	7	41	7	45
22	7	13	7	17	7	19	7	22	7	25	7	29	7	32	7	35	7	39	7	43	7	46	7	50
23	7	18	7	21	7	24	7	27	7	30	7	33	7	37	7	40	7	44	7	48	7	52	7	56
24	7	21	7	25	7	28	7	31	7	34	7	38	7	42	7	45	7	49	7	54	7	58	8	3
25	7	25	7	29	7	32	7	35	7	39	7	43	7	47	7	51	7	55	7	59	8	4	8	9
26	7	29	7	33	7	36	7	40	7	44	7	48	7	52	7	56	8	1	8	5	8	10	8	15
27	7	34	7	37	7	41	7	45	7	49	7	53	7	57	8	2	8	6	8	12	8	17	8	22
28	7	38	7	42	7	45	7	49	7	54	7	58	8	3	8	7	8	12	8	18	8	23	8	29
29	7	42	7	46	7	50	7	54	7	59	8	4	8	9	8	13	8	19	8	24	8	30	8	37

Dec	Latitude of a *different* Name from the Declination.																							
	37°		38°		39°		40°		41°		42°		43°		44°		45°		46°		47°		48°	
0	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m.	h.	m	h.	m.	h.	m.	h.	m.	h.	m.
1	6	0	6	0	5	59	5	59	5	59	5	59	5	59	5	59	5	59	5	59	5	59	5	59
2	5	57	5	56	5	56	5	56	5	56	5	56	5	55	5	55	5	55	5	55	5	55	5	54
3	5	54	5	53	5	53	5	53	5	52	5	52	5	52	5	51	5	51	5	51	5	50	5	50
4	5	51	5	50	5	50	5	49	5	49	5	48	5	48	5	47	5	47	5	46	5	46	5	45
5	5	48	5	47	5	46	5	46	5	45	5	45	5	44	5	44	5	43	5	42	5	42	5	41
6	5	44	5	44	5	43	5	43	5	42	5	41	5	40	5	40	5	39	5	38	5	37	5	36
7	5	41	5	41	5	40	5	39	5	38	5	37	5	37	5	36	5	35	5	34	5	33	5	32
8	5	38	5	37	5	37	5	36	5	35	5	34	5	33	5	32	5	31	5	30	5	28	5	27
9	5	35	5	34	5	33	5	32	5	31	5	30	5	29	5	28	5	27	5	25	5	24	5	23
10	5	32	5	31	5	30	5	29	5	28	5	26	5	25	5	24	5	22	5	21	5	20	5	18
11	5	29	5	28	5	27	5	25	5	24	5	23	5	21	5	20	5	18	5	17	5	15	5	13
12	5	26	5	25	5	23	5	22	5	20	5	19	5	17	5	16	5	14	5	12	5	11	5	9
13	5	23	5	21	5	20	5	18	5	17	5	15	5	13	5	12	5	10	5	8	5	6	5	4
14	5	19	5	18	5	16	5	15	5	13	5	11	5	9	5	7	5	5	5	3	5	1	4	59
15	5	16	5	14	5	13	5	11	5	9	5	7	5	5	5	3	5	1	4	59	4	57	4	54
16	5	13	5	11	5	9	5	7	5	5	5	3	5	1	4	59	4	57	4	54	4	52	4	49
17	5	10	5	8	5	6	5	4	5	1	4	59	4	57	4	55	4	52	4	50	4	47	4	44
18	5	6	5	4	5	2	4	59	4	57	4	55	4	53	4	50	4	47	4	45	4	42	4	39
19	5	3	5	0	4	58	4	56	4	53	4	51	4	48	4	46	4	43	4	40	4	37	4	34
20	4	59	4	57	4	54	4	52	4	49	4	47	4	44	4	41	4	38	4	35	4	32	4	28
21	4	56	4	53	4	51	4	48	4	45	4	42	4	39	4	36	4	33	4	30	4	26	4	23
22	4	52	4	49	4	47	4	44	4	41	4	38	4	35	4	32	4	28	4	25	4	21	4	17
23	4	49	4	46	4	43	4	40	4	37	4	33	4	30	4	27	4	23	4	19	4	15	4	11
24	4	45	4	42	4	39	4	35	4	32	4	29	4	25	4	22	4	18	4	14	4	10	4	5
25	4	41	4	38	4	34	4	31	4	28	4	24	4	20	4	17	4	13	4	8	4	4	3	59
26	4	36	4	34	4	30	4	27	4	23	4	19	4	15	4	11	4	7	4	3	3	58	3	53
27	4	33	4	29	4	26	4	22	4	18	4	14	4	10	4	6	4	1	3	57	3	52	3	46
28	4	29	4	25	4	21	4	17	4	13	4	9	4	5	4	0	3	55	3	50	3	45	3	40
29	4	25	4	21	4	17	4	13	4	8	4	4	3	59	3	54	3	49	3	44	3	38	3	33

TABLE XX.—Semidiurnal Arcs, for each degree of Latitude.

(Allowing for Refraction.)

Latitude of the *same* Name as the Declination.

Dec.	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°
°	h. m	h. m	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	6 8	6 8	6 8	6 9	6 9	6 9	6 9	6 10	6 10	6 10	6 11	6 11
2	6 12	6 13	6 13	6 14	6 14	6 15	6 15	6 16	6 16	6 17	6 17	6 18
3	6 17	6 18	6 18	6 19	6 19	6 20	6 21	6 22	6 22	6 23	6 24	6 25
4	6 22	6 22	6 22	6 24	6 25	6 26	6 27	6 28	6 29	6 30	6 31	6 32
5	6 26	6 27	6 27	6 29	6 30	6 31	6 32	6 34	6 35	6 36	6 38	6 39
6	6 31	6 32	6 33	6 34	6 36	6 37	6 38	6 40	6 41	6 43	6 44	6 46
7	6 36	6 37	6 38	6 40	6 41	6 43	6 44	6 46	6 48	6 49	6 51	6 53
8	6 41	6 42	6 43	6 45	6 47	6 48	6 50	6 52	6 54	6 56	6 58	7 1
9	6 45	6 47	6 48	6 50	6 52	6 54	6 56	6 58	7 1	7 3	7 5	7 8
10	6 50	6 52	6 54	6 56	6 58	7 0	7 2	7 5	7 7	7 10	7 13	7 16
11	6 55	6 57	6 59	7 1	7 3	7 6	7 8	7 11	7 14	7 17	7 20	7 23
12	7 0	7 2	7 4	7 7	7 9	7 12	7 15	7 18	7 21	7 24	7 27	7 31
13	7 5	7 7	7 10	7 12	7 15	7 18	7 21	7 24	7 28	7 31	7 35	7 39
14	7 10	7 13	7 15	7 18	7 21	7 24	7 28	7 31	7 35	7 39	7 43	7 47
15	7 15	7 18	7 21	7 24	7 27	7 31	7 34	7 39	7 42	7 46	7 51	7 56
16	7 21	7 24	7 27	7 30	7 33	7 37	7 41	7 45	7 49	7 54	7 59	8 4
17	7 26	7 29	7 33	7 36	7 40	7 44	7 48	7 52	7 57	8 2	8 7	8 13
18	7 31	7 35	7 38	7 42	7 46	7 51	7 55	8 0	8 5	8 10	8 16	8 22
19	7 37	7 41	7 45	7 49	7 53	7 58	8 2	8 7	8 13	8 19	8 25	8 32
20	7 43	7 47	7 51	7 55	8 0	8 5	8 10	8 15	8 21	8 28	8 35	8 42
21	7 49	7 53	7 57	8 2	8 7	8 12	8 18	8 24	8 30	8 37	8 45	8 53
22	7 55	7 59	8 4	8 9	8 14	8 20	8 26	8 32	8 39	8 47	8 55	9 4
23	8 1	8 6	8 11	8 16	8 22	8 28	8 34	8 41	8 49	8 57	9 6	9 16
24	8 7	8 12	8 18	8 24	8 30	8 36	8 43	8 51	8 59	9 8	9 18	9 29
25	8 14	8 19	8 25	8 31	8 38	8 45	8 53	9 1	9 10	9 20	9 31	9 44
26	8 21	8 27	8 33	8 39	8 47	8 54	9 2	9 11	9 21	9 33	9 45	10 0
27	8 28	8 34	8 41	8 48	8 56	9 4	9 13	9 23	9 34	9 46	10 1	10 18
28	8 35	8 42	8 49	8 57	9 5	9 14	9 24	9 35	9 48	10 2	10 19	10 42
29	8 43	8 50	8 58	9 6	9 14	9 25	9 36	9 49	10 3	10 20	10 42	11 16

Latitude of a *different* Name from the Declination.

Dec.	49°	50°	51°	52°	53°	54°	55°	56°	57°	58°	59°	60°
°	h. m	h. m	h m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.	h. m.
1	5 59	5 59	5 58	5 58	5 58	5 58	5 58	5 58	5 58	5 58	5 57	5 57
2	5 54	5 54	5 53	5 53	5 53	5 53	5 52	5 52	5 52	5 51	5 51	5 50
3	5 49	5 49	5 49	5 48	5 48	5 47	5 47	5 46	5 45	5 45	5 44	5 43
4	5 45	5 44	5 44	5 43	5 42	5 42	5 41	5 40	5 39	5 38	5 37	5 36
5	5 40	5 39	5 39	5 38	5 37	5 36	5 35	5 34	5 33	5 32	5 31	5 29
6	5 35	5 35	5 34	5 33	5 31	5 30	5 29	5 28	5 27	5 25	5 24	5 22
7	5 31	5 30	5 29	5 27	5 26	5 25	5 23	5 22	5 20	5 19	5 17	5 15
8	5 26	5 25	5 23	5 22	5 21	5 19	5 17	5 16	5 14	5 12	5 10	5 8
9	5 21	5 20	5 18	5 17	5 16	5 13	5 12	5 10	5 8	5 5	5 3	5 1
10	5 17	5 15	5 13	5 11	5 10	5 8	5 5	5 3	5 1	4 59	4 56	4 53
11	5 12	5 10	5 8	5 6	5 4	5 2	4 59	4 57	4 54	4 52	4 49	4 46
12	5 7	5 5	5 3	5 0	4 58	4 56	4 53	4 51	4 48	4 45	4 42	4 38
13	5 2	5 0	4 57	4 55	4 52	4 50	4 47	4 44	4 41	4 38	4 34	4 30
14	4 57	4 54	4 52	4 49	4 47	4 44	4 41	4 37	4 34	4 30	4 27	4 23
15	4 52	4 49	4 46	4 44	4 41	4 37	4 34	4 31	4 27	4 23	4 19	4 14
16	4 46	4 45	4 41	4 38	4 34	4 31	4 27	4 24	4 20	4 15	4 11	4 6
17	4 41	4 38	4 35	4 32	4 28	4 23	4 21	4 17	4 12	4 8	4 3	3 57
18	4 36	4 33	4 29	4 26	4 22	4 18	4 14	4 9	4 5	4 0	3 54	3 48
19	4 30	4 27	4 23	4 19	4 15	4 11	4 7	4 2	3 56	3 51	3 45	3 39
20	4 25	4 21	4 17	4 13	4 9	4 4	3 59	3 54	3 49	3 43	3 36	3 29
21	4 19	4 15	4 11	4 6	4 2	3 57	3 52	3 46	3 40	3 34	3 27	3 19
22	4 13	4 9	4 4	4 0	3 55	3 50	3 44	3 38	3 31	3 24	3 17	3 9
23	4 7	4 3	3 58	3 53	3 47	3 42	3 36	3 29	3 23	3 15	3 6	2 57
24	4 1	3 56	3 51	3 46	3 40	3 34	3 27	3 20	3 13	3 5	2 55	2 45
25	3 54	3 49	3 44	3 38	3 32	3 25	3 18	3 11	3 3	2 53	2 43	2 32
26	3 48	3 42	3 37	3 30	3 24	3 17	3 9	3 1	2 52	2 42	2 31	2 18
27	3 41	3 35	3 29	3 22	3 15	3 8	2 59	2 50	2 40	2 29	2 16	2 2
28	3 34	3 28	3 21	3 14	3 6	2 58	2 49	2 38	2 28	2 15	2 1	1 43
29	3 26	3 20	3 12	3 5	2 56	2 47	2 37	2 26	2 14	2 0	1 42	1 21

TABLE XXI.—Semidiurnal Arcs, including mean Parallax and Refraction, for the Latitude of Greenwich.

MOON.

☾'s Dec.	Declination. North.		Declination. South.		Increase of the Semidiurnal Arc, on account of the meridional retardation. Daily Variation of Time of Transit.							
					Semid. Arc.	m. 40	m. 44	m. 48	m. 52	m. 56	m. 60	m. 64	m. 68
°	h.	m.	h.	m.	h. m.	m.	m.	m.	m.	m.	m.	m.	m.
0	6	7	6	7	2 40	0	0	1	1	2	2	3	3
1	6	13	+6	6	2 −5	0	0	1	1	2	2	3	3
2	6	18	5	5	57 5	0	1	1	2	2	3	3	4
3	6	23	5	5	52 5	0	1	1	2	2	3	4	4
4	6	28	5	5	47 6	0	1	1	2	3	3	4	5
5	6	33	5	5	41 5	0	1	1	2	3	4	4	5
6	6	38	5	5	36 5	0	1	2	2	3	4	5	5
7	6	44	6	5	31 6	0	1	2	2	3	4	5	6
8	6	49	5	5	25 5	0	1	2	3	4	5	6	7
9	6	54	5	5	20 5	0	1	2	3	4	5	6	7
10	7	0	5	5	15 6	0	1	2	3	4	5	6	7
11	7	5	6	5	9 6	0	1	2	3	4	5	6	8
12	7	11	5	5	3 5	0	1	2	3	4	5	7	8
13	7	16	6	4	58 6	0	1	2	3	4	6	7	8
14	7	22	6	4	52 6	0	1	2	3	5	6	7	8
15	7	28	6	4	46 6	0	1	2	3	5	6	7	9
16	7	34	6	4	40 6	0	1	2	4	5	6	8	9
17	7	40	6	4	34 6	0	1	2	4	5	7	8	9
18	7	46	6	4	28 6	0	1	3	4	5	7	8	10
19	7	52	7	4	22 7	0	1	3	4	5	7	8	10
20	7	59	6	4	15 7	0	1	3	4	6	7	9	10
21	8	5	7	4	8 7	0	1	3	4	6	7	9	11
22	8	12	7	4	1 7	0	1	3	5	6	8	9	11
23	8	19	7	3	54 7	0	1	3	5	6	8	10	11
24	8	26	8	3	47 8	0	1	3	5	6	8	10	12
25	8	34	8	3	39 8	0	1	3	5	7	8	10	12
26	8	42	8	3	31 8	0	1	3	5	7	9	11	13
27	8	50	8	3	23 9	0	1	3	5	7	9	11	13
28	8	58	+9	3	14 −10	0	1	3	5	7	9	11	14
29	9	7		3	4								

TABLE XXII.—Semidiurnal Arcs, including mean Refraction, for the Latitude of Greenwich.

SUN AND STARS.						
Dec.	Declination.					
	North.			South.		
°	h.	m.		h.	m.	
0	6	4		6	4	
			+ 5			− 5
1	6	9		5	59	
			5			5
2	6	14		5	54	
			5			5
3	6	19		5	49	
			5			6
4	6	24		5	43	
			5			5
5	6	29		5	38	
			5			5
6	6	34		5	33	
			5			5
7	6	39		5	28	
			5			5
8	6	44		5	23	
			6			5
9	6	50		5	18	
			5			5
10	6	55		5	13	
			5			6
11	7	0		5	7	
			6			5
12	7	6		5	2	
			5			6
13	7	11		4	56	
			6			5
14	7	17		4	51	
			6			6
15	7	23		4	45	
			5			5
16	7	28		4	40	
			6			6
17	7	34		4	34	
			6			6
18	7	40		4	28	
			7			6
19	7	47		4	22	
			6			7
20	7	53		4	15	
			7			6
21	8	0		4	9	
			6			7
22	8	6		4	2	
			7			6
23	8	13		3	56	
			8			7
24	8	21		3	49	
			7			8
25	8	28		3	41	
			8			7
26	8	36		3	34	
			8			8
27	8	44		3	26	
			9			8
28	8	53		3	18	
			9			9
29	9	2		3	9	
			+ 10			− 9
30	9	12		3	0	

TABLE XXIII.—Reduction of the Moon's Horizontal Parallax and Semidiameter to any given Greenwich Time.

Diff. in 12 hours.	Reduced Time after Noon or Midnight.															
	h.m. 0 10	h.m. 0 20	h.m. 0 30	h.m. 0 40	h.m. 0 50	h.m. 1 0	h.m. 2 0	h.m. 3 0	h.m. 4 0	h.m. 5 0	h.m. 6 0	h.m. 7 0	h.m. 8 0	h.m. 9 0	h.m. 10 0	h. m. 11 0
"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"	"
1	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1
2	0	0	0	0	0	0	0	0	1	1	1	1	1	2	2	2
3	0	0	0	0	0	0	0	1	1	1	1	2	2	2	3	3
4	0	0	0	0	0	0	1	1	1	2	2	2	3	3	3	4
5	0	0	0	0	0	0	1	1	2	2	2	3	3	4	4	5
6	0	0	0	0	0	0	1	1	2	2	3	3	4	5	5	6
7	0	0	0	0	0	1	1	2	2	3	3	4	5	5	6	6
8	0	0	0	0	1	1	1	2	3	3	4	5	5	6	7	7
9	0	0	0	0	1	1	1	2	3	4	4	5	6	7	8	8
10	0	0	0	1	1	1	2	2	3	4	5	6	7	8	8	9
11	0	0	0	1	1	1	2	3	4	5	5	6	7	8	9	10
12	0	0	0	1	1	1	2	3	4	5	6	7	8	9	10	11
13	0	0	1	1	1	1	2	3	4	5	6	8	9	10	11	12
14	0	0	1	1	1	1	2	3	5	6	7	8	9	11	12	13
15	0	0	1	1	1	1	2	4	5	6	7	9	10	11	13	14
16	0	0	1	1	1	1	3	4	5	7	8	9	11	12	13	15
17	0	0	1	1	1	1	3	4	6	7	8	10	11	13	14	16
18	0	0	1	1	1	1	3	4	6	7	9	11	12	14	15	17
19	0	1	1	1	1	2	3	5	6	8	9	11	13	14	16	17
20	0	1	1	1	1	2	3	5	7	8	10	12	13	15	17	18
21	0	1	1	1	2	2	3	5	7	9	10	12	14	16	18	19
22	0	1	1	1	2	2	4	5	7	9	11	13	15	17	18	20
23	0	1	1	1	2	2	4	6	8	10	11	13	15	17	19	21
24	0	1	1	1	2	2	4	6	8	10	12	14	16	18	20	22
25	0	1	1	1	2	2	4	6	8	10	12	15	17	19	21	23
26	0	1	1	1	2	2	4	6	9	11	13	15	17	20	22	24
27	0	1	1	1	2	2	4	7	9	11	13	16	18	20	23	25
28	0	1	1	2	2	2	5	7	9	12	14	16	19	21	22	26
29	0	1	1	2	2	2	5	7	10	12	14	17	19	22	24	27
30	0	1	1	2	2	2	5	7	10	12	15	17	20	23	25	28
31	0	1	1	2	2	3	5	8	10	13	15	18	21	23	26	28
32	0	1	1	2	2	3	5	8	11	13	16	19	21	24	27	29
33	0	1	1	2	2	3	5	8	11	14	16	19	22	25	28	30
34	0	1	1	2	2	3	6	8	11	14	17	20	22	26	28	31
35	0	1	1	2	2	3	6	9	12	15	17	20	23	26	29	32
36	0	1	2	2	2	3	6	9	12	15	18	21	24	27	30	33
37	1	1	2	2	3	3	6	9	12	15	18	22	25	28	31	34
38	1	1	2	2	3	3	6	9	13	16	19	22	25	29	32	35
39	1	1	2	2	3	3	6	10	13	16	19	23	26	29	33	36
40	1	1	2	2	3	3	7	10	13	17	20	23	27	30	33	37
41	1	1	2	2	3	3	7	10	14	17	20	24	27	31	34	38
42	1	1	2	2	3	3	7	10	14	17	21	25	28	32	35	39
43	1	1	2	2	3	4	7	11	14	18	21	25	29	32	36	40
44	1	1	2	2	3	4	7	11	15	18	22	26	29	33	37	40
45	1	1	2	2	3	4	7	11	15	19	22	26	30	34	38	41
46	1	1	2	3	3	3	4	8	11	15	19	23	27	31	35	38	42
47	1	1	2	3	3	4	8	12	16	19	23	27	31	35	39	43
48	1	1	2	3	3	4	8	12	16	20	24	28	32	36	40	44
49	1	1	2	3	3	4	8	12	16	20	24	29	33	37	41	45
50	1	1	2	3	4	4	8	12	17	21	25	29	33	38	42	46
51	1	1	2	3	4	4	8	13	17	21	25	30	34	38	43	47
52	1	1	2	3	4	4	9	13	17	22	26	30	35	39	43	48
53	1	1	2	3	4	4	9	13	18	22	26	31	35	40	44	49
54	1	2	2	3	4	4	9	13	18	22	27	32	36	41	45	50
55	1	2	2	3	4	5	9	14	18	23	27	32	37	42	46	50
56	1	2	2	3	4	5	9	14	19	23	28	33	37	42	47	51
57	1	2	2	3	4	5	9	14	19	24	28	33	38	43	48	52
58	1	2	2	3	4	5	10	14	19	24	29	34	39	44	48	53
59	1	2	2	3	4	5	10	15	20	25	29	34	39	44	49	54
60	1	2	2	3	4	5	10	15	20	25	30	35	40	45	50	55

TABLE XXIV.

Joint Correction of an Observed Altitude of the Sun's lower limb for Dip, Refraction, Parallax, and Semidiameter.

(*Additive.*)

Obs. Alt.	Height of the Eye above the Sea in Feet.													
	6	8	10	12	14	16	18	20	22	24	26	28	32	36
°	′	′	′	′	′	′	′	′	′	′	′	′	′	′
5	3.9	3.5	3.2	3.0	2.7	2.4	2.2	2.0	1.8	1.6	1.4	1.2	0.8	0.5
6	5.3	4.9	4.6	4.3	4.1	3.8	3.6	3.4	3.2	3.0	2.8	2.6	2.2	1.9
7	6.4	6.0	5.7	5.4	5.2	4.9	4.7	4.5	4.3	4.1	3.9	3.7	3.3	3.0
8	7.2	6.9	6.6	6.3	6.0	5.7	5.5	5.3	5.1	4.9	4.7	4.5	4.2	3.8
9	7.9	7.5	7.2	6.9	6.6	6.4	6.1	5.9	5.7	5.5	5.3	5.1	4.8	4.4
10	8.5	8.1	7.8	7.5	7.2	6.9	6.7	6.5	6.2	6.0	5.8	5.6	5.3	4.9
11	8.9	8.6	8.2	7.9	7.6	7.4	7.2	6.9	6.7	6.5	6.3	6.1	5.7	5.4
12	9.3	9.0	8.6	8.3	8.0	7.8	7.6	7.3	7.1	6.9	6.7	6.5	6.2	5.8
13	9.6	9.3	9.0	8.7	8.4	8.1	7.9	7.7	7.4	7.2	7.0	6.8	6.5	6.1
14	9.9	9.6	9.2	8.9	8.7	8.4	8.2	7.9	7.7	7.5	7.3	7.1	6.8	6.4
15	10.2	9.8	9.5	9.2	8.9	8.7	8.4	8.2	8.0	7.8	7.6	7.4	7.0	6.7
16	10.4	10.1	9.7	9.4	9.1	8.9	8.7	8.4	8.2	8.0	7.8	7.6	7.2	6.9
17	10.6	10.3	9.9	9.6	9.3	9.1	8.9	8.6	8.3	8.2	8.0	7.8	7.4	7.1
18	10.8	10.4	10.1	9.8	9.5	9.3	9.0	8.8	8.6	8.4	8.2	8.0	7.6	7.3
19	11.0	10.6	10.3	10.0	9.7	9.4	9.2	9.0	8.8	8.5	8.3	8.1	7.8	7.4
20	11.1	10.7	10.4	10.1	9.8	9.6	9.3	9.1	8.9	8.7	8.5	8.2	7.9	7.6
21	11.2	10.9	10.5	10.2	10.0	9.7	9.5	9.2	9.0	8.8	8.6	8.4	8.1	7.7
22	11.4	11.0	10.7	10.4	10.1	9.8	9.6	9.4	9.1	8.9	8.7	8.5	8.2	7.8
23	11.5	11.1	10.8	10.5	10.2	9.9	9.7	9.5	9.2	9.0	8.8	8.6	8.3	7.9
24	11.6	11.2	10.9	10.6	10.3	10.0	9.8	9.6	9.3	9.1	8.9	8.7	8.4	8.0
25	11.7	11.3	11.0	10.7	10.4	10.1	9.9	9.7	9.4	9.2	9.0	8.8	8.5	8.1
26	11.7	11.4	11.0	10.7	10.5	10.2	10.0	9.7	9.5	9.3	9.1	8.9	8.6	8.2
27	11.8	11.5	11.1	10.8	10.5	10.3	10.1	9.8	9.6	9.4	9.2	9.0	8.6	8.3
28	11.9	11.6	11.2	10.9	10.6	10.4	10.2	9.9	9.7	9.5	9.3	9.1	8.7	8.4
30	12.0	11.7	11.3	11.0	10.8	10.5	10.3	10.0	9.8	9.6	9.4	9.2	8.9	8.5
32	12.2	11.8	11.5	11.2	10.9	10.6	10.4	10.2	9.9	9.7	9.5	9.3	9.0	8.6
34	12.3	11.9	11.6	11.3	11.0	10.7	10.5	10.3	10.1	9.9	9.6	9.4	9.1	8.7
36	12.4	12.0	11.7	11.4	11.1	10.8	10.6	10.4	10.2	9.9	9.7	9.5	9.2	8.8
38	12.5	12.1	11.8	11.5	11.2	10.9	10.7	10.5	10.2	10.0	9.8	9.6	9.3	8.9
40	12.5	12.2	11.8	11.5	11.3	11.0	10.8	10.5	10.3	10.1	9.9	9.7	9.4	9.0
42	12.6	12.2	11.9	11.6	11.3	11.1	10.8	10.6	10.4	10.2	10.0	9.8	9.4	9.1
44	12.7	12.3	12.0	11.7	11.4	11.1	10.9	10.7	10.5	10.2	10.1	9.8	9.5	9.1
46	12.7	12.4	12.0	11.7	11.5	11.2	11.0	10.7	10.5	10.3	10.2	9.9	9.6	9.2
48	12.8	12.4	12.1	11.8	11.5	11.3	11.0	10.8	10.6	10.4	10.2	10.0	9.6	9.3
50	12.8	12.5	12.2	11.9	11.6	11.3	11.1	10.9	10.6	10.4	10.3	10.0	9.7	9.3
52	12.9	12.5	12.2	11.9	11.6	11.4	11.1	10.9	10.7	10.5	10.3	10.1	9.7	9.4
54	13.0	12.6	12.3	12.0	11.7	11.4	11.2	11.0	10.7	10.5	10.3	10.1	9.8	9.4
56	13.0	12.6	12.3	12.0	11.7	11.5	11.2	11.0	10.8	10.6	10.4	10.2	9.8	9.5
58	13.0	12.7	12.3	12.0	11.7	11.5	11.3	11.0	10.8	10.6	10.4	10.2	9.9	9.5
60	13.1	12.7	12.4	12.1	11.8	11.6	11.3	11.1	10.9	10.6	10.4	10.2	9.9	9.5
62	13.1	12.8	12.4	12.1	11.8	11.6	11.4	11.1	10.9	10.7	10.5	10.3	9.9	9.6
66	13.2	12.8	12.5	12.2	11.9	11.7	11.4	11.2	11.0	10.8	10.6	10.4	10.0	9.7
70	13.3	12.9	12.6	12.3	12.0	11.8	11.5	11.3	11.0	10.8	10.6	10.4	10.1	9.7
80	13.4	13.1	12.7	12.4	12.1	11.9	11.7	11.4	11.2	11.0	10.8	10.6	10.2	9.9
90	13.6	13.2	12.9	12.6	12.3	12.0	11.8	11.6	11.3	11.1	10.9	10.7	10.4	10.0

Month	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Corrn.	+0′.3	+0′.2	+0′.1	0′.0	−0′.2	−0′.2	−0′.2	−0′.2	−0′.1	+0′.1	+0′.2	+0′.3

TABLE XXV.

Diminution of ☽'s Semidiameter.

Dec.	Dim.
°	′
5	0·0
6	0·1
7	0·1
8	0·1
9	0·1
10	0·2
11	0·2
12	0·2
13	0·3
14	0·3
15	0·4
16	0·4
17	0·5
18	0·5
19	0·6
20	0·6
21	0·7
22	0·8
23	0·8
24	0·9
25	1·0
26	1·1
27	1·2
28	1·3
29	1·4

TABLE XXVI.—☉'s Diminished Semidiameter.

Date.	Semid.	Date.	Semid.
	′		′
January . . . 1	15·4	July 1	15·0
,, . . . 8	15·5	,, . . . 8	15·1
,, . . . 14	15·6	,, . . . 15	15·2
,, . . . 20	15·7	,, . . . 22	15·3
,, . . . 25	15·8	,, . . . 31	
,, . . . 31		August 1	15·4
February . . 1	15·9	,, . . . 15	15·5
,, . . . 15	16·0	,, . . . 22	15·6
,, . . . 22	16·1	,, . . . 31	
,, . . . 29		September . . 1	15·7
March 1	16·1	,, . . . 8	15·8
,, . . . 30		,, . . . 15	15·9
April 1	16·0	,, . . . 22	16·0
,, . . . 8	15·9	,, . . . 30	
,, . . . 15	15·8	October . . . 1	15·9
,, . . . 22	15·7	,, . . . 15	15·8
,, . . . 30		,, . . . 31	
May 1	15·6	November . . 1	15·7
,, . . . 8	15·5	,, . . . 15	15·6
,, . . . 15	15·4	,, . . . 30	
,, . . . 22	15·3	December . . 1	15·5
,, . . . 26	15·2	,, . . . 15	15·4
,, . . . 31		,, . . . 31	
June 1	15·1		
,, . . . 8	15·0		
,, . . . 15	14·9		
,, . . . 30			

TABLE XXVII.—For Deducing the Time of High Water at London Bridge.

Transit.	Principal Correction (*additive.*)	Factor.	Transit.	Principal Correction (*additive.*)	Factor.	Transit.	Principal Correction (*additive.*)	Factor.
h. m.	h. m.	m.	h. m.	h. m.	m.	h. m.	h. m.	m.
0 0	2 0	+ 4	3 40	1 10	− 3	7 55	1 31	− 1
5	1 59		45	9	− 4	57	32	
10	58		50	8		59	33	0
15	57		55	7		8 2	34	
20	56		4 0	6		4	35	+ 1
0 25	1 55		4 5	1 5	− 5	8 7	1 36	
30	54		10	4		9	37	+ 2
35	53	+ 3	15	3	− 6	11	38	
40	52		25	2	− 7	13	39	
45	51		30	1		15	40	+ 3
0 50	1 50		4 36	1 0		8 17	1 41	
55	49	+ 2	46	0 59	− 8	19	42	+ 4
1 0	48		56	58		21	43	
4	47		5 6	57		23	44	
7	46		26	56	− 9	26	45	+ 5
1 10	1 45		5 55	0 57	−10	8 28	1 46	
15	44	+ 1	6 15	58	− 9	31	47	+ 6
20	43		20	59		33	48	
24	42		25	1 0		36	49	+ 7
27	41		30	1		40	50	
1 30	1 40		6 35	1 2		8 44	1 51	+ 8
35	39		40	3		47	52	
40	38		44	4		50	53	
44	37		47	5		52	54	
47	36		50	6		54	55	
1 50	1 35		6 54	1 7	− 8	8 56	1 56	
55	34		57	8		58	57	
2 0	33	0	7 0	9		9 3	58	+ 9
4	32		4	10		7	59	
7	31	− 1	7	11		10	2 0	
2 10	1 30		7 10	1 12		9 14	2 1	
15	29		12	13		17	2	
20	28		14	14	− 7	20	3	
24	27		16	15		25	4	
27	26		18	16		30	5	
2 30	1 25		7 21	1 17		9 35	2 6	
35	24		23	18		40	7	
40	23		26	19	− 6	45	8	+10
44	22	− 2	28	20		55	9	
47	21		32	21		10 5	10	+ 9
2 50	1 20		7 34	1 22	− 5	10 36	2 9	+ 8
55	19		36	23		56	8	+ 7
3 0	18		38	24	− 4	11 6	7	
5	17		42	25		16	6	+ 6
10	16		44	26	− 3	26	5	
3 15	1 15		7 47	1 27		11 35	2 4	+ 5
20	14		49	28	− 2	40	3	
25	13	− 3	51	29		46	2	
30	12		53	30		55	1	+ 4
35	11		7 55	1 31	− 1	12 0	2 0	
3 40	1 10							

TABLE XXVIII.

Difference between the Geographical and Geocentric Latitudes.

Argument χ, *either Latitude.*

χ	$l'-l$	χ	$l'-l$	χ	$l'-l$	χ	$l'-l$
° °	′ ″	° °	′ ″	° °	′ ″	33° 57°	10′ 19″
0 90	0 0	11 79	4 14	22 68	7 51	34 56	10 28
1 89	0 24	12 78	4 36	23 67	8 7	35 55	10 37
2 88	0 47	13 77	4 57	24 66	8 23	36 54	10 44
3 87	1 11	14 76	5 18	25 65	8 39	37 53	10 51
4 86	1 34	15 75	5 39	26 64	8 54	38 52	10 57
5 85	1 58	16 74	5 59	27 63	9 8	39 51	11 3
6 84	2 21	17 73	6 19	28 62	9 22	40 50	11 7
7 83	2 44	18 72	6 38	29 61	9 34	41 49	11 11
8 82	3 7	19 71	6 57	30 60	9 47	42 48	11 14
9 81	3 29	20 70	7 15	31 59	9 58	43 47	11 16
10 80	3 52	21 69	7 33	32 58	10 9	44 46	11 17
11 79	4 14	22 68	7 51	33 57	10 19	45 45	11 17

The difference is to be *subtracted* from the geographical, or *added* to the geocentric latitude, whether it be North or South

TABLE XXIX.

Log. Radius of the Earth.

Argument: Geocentric Latitude.

l	log. ϱ	l	log. ϱ	l	log. ϱ	l	log. ϱ
°		°		°		°	
0	0.00000	23	9.99978	45	9.99929	67	9.99879
1	0.00000	24	9.99976	46	9.99926	68	9.99877
2	0.00000	25	9.99974	47	9.99924	69	9.99876
3	0.00000	26	9.99973	48	9.99921	70	9.99874
4	9.99999	27	9.99971	49	9.99919	71	9.99872
5	9.99999	28	9.99968	50	9.99916	72	9.99871
6	9.99998	29	9.99966	51	9.99914	73	9.99870
7	9.99998	30	9.99964	52	9.99911	74	9.99868
8	9.99997	31	9.99962	53	9.99909	75	9.99867
9	9.99997	32	9.99960	54	9.99907	76	9.99866
10	9.99996	33	9.99958	55	9.99904	77	9.99865
11	9.99995	34	9.99955	56	9.99902	78	9.99864
12	9.99994	35	9.99953	57	9.99900	79	9.99863
13	9.99993	36	9.99951	58	9.99897	80	9.99862
14	9.99992	37	9.99948	59	9.99895	81	9.99861
15	9.99990	38	9.99946	60	9.99893	82	9.99860
16	9.99989	39	9.99943	61	9.99891	83	9.99859
17	9.99988	40	9.99941	62	9.99889	84	9.99859
18	9.99986	41	9.99938	63	9.99887	85	9.99858
19	9.99985	42	9.99936	64	9.99885	86	9.99858
20	9.99983	43	9.99934	65	9.99883	87	9.99858
21	9.99982	44	9.99931	66	9.99881	88	9.99858
22	9.99980	45	9.99929	67	9.99879	89	9.99857
23	9.99978					90	9.99857

TABLE XXX.

For reducing the *True* to the *App.* ☌ in R. A.

Hour Angle *h* at true ☌.		ϵ	$\epsilon^{(1)}$	Hour Angle *h* at true ☌.		ϵ	$\epsilon^{(1)}$
h. m.	h. m.	+ −	same sign as *h.*	h. m.	h. m.	+ −	same sign as *h.*
0 0	12 0	25	0	3 0	9 0	18	71
10	11 50	25	4	10	8 50	17	74
20	40	25	9	20	40	16	77
30	30	25	13	30	30	15	79
40	20	25	17	40	20	14	82
50	10	25	22	50	10	14	84
1 0	11 0	24	26	4 0	8 0	13	87
10	10 50	24	30	10	7 50	12	89
20	40	24	34	20	40	11	91
30	30	23	38	30	30	10	92
40	20	23	42	40	20	9	94
50	10	22	46	50	10	8	95
2 0	10 0	22	50	5 0	7 0	7	97
10	9 50	21	54	10	6 50	5	98
20	40	21	57	20	40	4	98
30	30	20	61	30	30	3	99
40	20	19	64	40	20	2	100
50	10	19	68	50	10	1	100
3 0	9 0	18	71	6 0	6 0	0	100

TABLE XXXI.

Auxiliary Quantities depending on Geographical Position.

Place.	ρ	cot. *l*	cos. *l*	*f*	Longitude.
					h. m. s.
Aberdeen	9.99900	+9.81289	9.73637	3.12	W. 0 8 23
Altona	9.99908	+9.87133	9.77576	2.85	E. 0 39 47
Berlin	9.99910	+9.88751	9.78603	2.79	E. 0 53 36
Bedford	9.99911	+9.89345	9.78974	2.76	W. 0 1 52
Cambridge	9.99911	+9.89231	9.78903	2.77	E. 0 0 24
Cape of Good Hope	9.99956	−0.17494	9.91980	2.05	E. 1 13 55
Dublin	9.99909	+9.87385	9.77737	2.84	W. 0 25 22
Edinburgh	9.99902	+9.83256	9.75001	3.03	W. 0 12 44
Greenwich	9.99913	+9.90381	9.79610	2.72	0 0 0
Ormskirk	9.99908	+9.87092	9.77549	2.85	W. 0 11 36
Oxford	9.99912	+9.89939	9.79340	2.74	W. 0 5 2
Kensington	9.99913	+9.90340	9.79586	2.72	W. 0 0 47
Milan	9.99928	+9.99577	9.84736	2.42	E. 0 36 47
Paris	9.99920	+9.94451	9.81997	2.58	E. 0 9 22
Slough	9.99913	+9.90337	9.79584	2.72	W. 0 2 24

TABLE XXXII.

Correction of Log. Parallax. Argument; log. *n*.

Log. *n*.	Corr.	Log. *n*.	Corr.	Log. *n*.	Corr.	Log. *n*.	Corr.	Log. *n*.	Corr.
5·00	0	7·080	52	7·380	104	7·680	209	7·970	407
·10	0	·090	53	·390	107	·690	213	·980	417
·20	1	·100	54	·400	109	·700	218	·990	427
·30	1	·110	55	·410	112	·710	223	8·000	436
·40	1	·120	57	·420	114	·720	229	·010	447
·50	1	·130	58	·430	117	·730	234	·020	457
·60	2	·140	60	·440	120	·740	240	·030	468
·70	2	·150	61	·450	123	·750	245	·040	479
·80	2	·160	63	·460	125	·760	251	·050	490
·90	3	·170	64	·470	128	·770	257	·060	501
6·00	4	·180	66	·480	131	·780	263	·070	513
·10	6	·190	68	·490	134	·790	269	·080	525
·20	7	·200	69	·500	137	·800	275	·090	537
·30	9	·210	71	·510	141	·810	281	·100	550
·40	11	·220	72	·520	144	·820	288	·110	563
·50	14	·230	74	·530	148	·830	294	·120	576
·60	17	·240	76	·540	151	·840	302	·130	590
·70	22	·250	77	·550	155	·850	308	·140	604
·80	27	·260	79	·560	158	·860	315	·150	618
·90	34	·270	81	·570	162	·870	323	·160	632
7·00	43	·280	83	·580	165	·880	331	·170	647
—	—	·290	85	·590	169	·890	338	·180	663
7·000	43	·300	87	·600	173	·900	346	·190	678
·010	44	·310	89	·610	177	·910	355	·200	694
·020	46	·320	91	·620	181	·920	363	·210	710
·030	47	·330	93	·630	186	·930	371	·220	727
·040	48	·340	95	·640	191	·940	379	·230	744
·050	49	·350	98	·650	195	·950	388	·240	761
·060	50	·360	100	·660	199	·960	398	·250	779
·070	51	·370	102	·670	204	7·970	407	8·260	798
7·080	52	7·380	104	7·680	209				

This correction is *additive* when *n* is positive, and *subtractive* when *n* is negative. For the parallax in declination it will always be *additive* if the Moon be above the horizon.

TABLE XXXIII.

Factor F for "*a* correction."

D.	F.	D.	F.	D.	F.	D.	F.	D.	F.
0		0		0		0		0	
0	·000	6	·091	12	·178	18	·256	24	·324
1	·015	7	·106	13	·191	19	·268	25	·334
2	·030	8	·120	14	·205	20	·280	26	·344
3	·046	9	·135	15	·218	21	·292	27	·353
4	·061	10	·149	16	·231	22	·303	28	·362
5	·076	11	·164	17	·244	23	·314	29	·370
6	·091	12	·178	18	·256	24	·324		

$$a \text{ corr. in } \textit{seconds} = \text{F.} \left(\frac{a}{10}\right)^2$$

a denoting the number of *minutes* it contains.

TABLE XXXIV.

Parallactic Angles for the Latitude of Greenwich. (*same sign as h.*)

Arguments: Apparent Hour Angle and *Declination.*

Dec.	Hour Angle *h*.															
North.	0	10	20	30	40	50	60	70	80	90	100	110	120	130	130	
°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	°	
0	0	8	15	22	27	31	35	37	38	39	38	37	35	31	27	
1	0	8	15	22	27	32	35	37	38	39	38	37	34	31	27	
2	0	8	16	22	28	32	35	37	38	39	38	37	34	31	27	
3	0	8	16	22	28	32	35	37	38	39	38	36	34	31	26	
4	0	8	16	23	28	32	35	37	38	39	38	36	34	31	26	
5	0	9	16	23	28	33	36	38	39	39	38	36	34	30	26	
6	0	9	17	23	29	33	36	38	39	39	38	36	34	30	26	
7	0	9	17	24	29	33	36	38	39	39	38	36	34	30	26	
8	0	9	17	24	29	34	36	38	39	39	38	36	33	30	25	
9	0	9	17	24	30	34	37	38	39	39	38	36	33	30	25	
10	0	9	18	25	30	34	37	39	39	39	38	36	33	30	25	
11	0	9	18	25	31	35	37	39	39	39	38	36	33	29	25	
12	0	10	18	25	31	35	38	39	40	39	38	36	33	29	25	
13	0	10	19	26	31	35	38	39	40	39	38	36	33	29	25	
14	0	10	19	26	32	36	38	40	40	39	38	36	33	29	25	
15	0	10	19	27	32	36	39	40	40	39	38	36	33	29	24	
16	0	11	20	27	32	37	39	40	40	40	38	36	33	29	24	
17	0	11	20	28	33	37	39	40	41	40	38	36	33	29	24	
18	0	11	21	28	34	38	40	41	41	40	38	36	33	29	24	
19	0	11	21	29	34	38	40	41	41	40	38	36	33	29	24	
20	0	12	22	29	35	39	41	41	41	40	38	36	33	29	24	
21	0	12	22	30	36	39	41	42	42	40	39	36	33	29	24	
22	0	12	23	30	36	40	42	42	42	41	39	36	33	29	24	
23	0	13	23	31	37	40	42	43	42	41	39	36	33	29	24	
24	0	13	24	32	38	41	43	43	42	41	39	36	33	29	24	
25	0	14	25	33	38	42	43	43	43	41	39	36	33	29	24	
26	0	14	26	34	39	42	44	44	43	42	39	36	33	29	24	
27	0	14	26	35	40	43	44	44	43	42	39	36	33	29	24	
28	0	15	27	35	41	43	45	45	44	42	40	37	33	29	24	
29	0	16	28	36	41	44	45	45	44	42	40	37	33	29	24	
South.																
0	0	8	15	22	27	31	35	37	38	39	38	37	35	31	27	
1	0	8	15	21	27	31	34	37	38	39	38	37	35	32	27	
2	0	8	15	21	27	31	34	37	38	39	38	37	35	32	28	
3	0	8	15	21	26	31	34	36	38	39	38	37	35	32	28	
4	0	7	15	21	26	31	34	36	38	39	38	37	35	32	28	
5	0	7	15	21	26	30	34	36	38	39	39	38	36	33	28	
6	0	7	14	20	26	30	34	36	38	39	39	38	36	33	29	
7	0	7	14	20	26	30	34	36	38	39	39	38	36	33	29	
8	0	7	14	20	25	30	33	36	38	39	39	38	36	34	29	
9	0	7	14	20	25	30	33	36	38	39	39	38	37	34	30	
10	0	7	14	20	25	30	33	36	38	39	39	39	37	34	30	
11	0	7	14	20	25	29	33	36	38	39	39	39	37	35	31	
12	0	7	14	20	25	29	33	36	38	39	40	39	38	35	31	
13	0	7	14	19	25	29	33	36	38	39	40	39	38	35	31	
14	0	7	13	19	25	29	33	36	38	39	40	40	38	36	32	
15	0	7	13	19	24	29	33	36	38	39	40	40	39	36	32	
16	0	7	13	19	24	29	33	36	38	40	40	40	39	37	32	
17	0	7	13	19	24	29	33	36	38	40	41	40	39	37	33	
18	0	7	13	19	24	29	33	36	38	40	41	41	40	38	34	
19	0	7	13	19	24	29	33	36	38	40	41	41	40	38	34	
20	0	7	13	19	24	29	33	36	38	40	41	41	41	39	35	
21	0	6	13	19	24	29	33	36	39	40	42	42	41	39	36	
22	0	6	13	19	24	29	33	36	39	41	42	42	42	40	36	
23	0	6	13	18	24	29	33	36	39	41	42	43	42	40	37	
24	0	6	13	18	24	29	33	36	39	41	42	43	43	41	38	
25	0	6	13	18	24	29	33	36	39	41	43	43	43	42	38	
26	0	6	13	18	24	29	33	36	39	42	43	44	44	42	39	
27	0	6	13	18	24	29	33	36	39	42	43	44	44	43	40	
28	0	6	12	18	24	29	33	37	40	42	44	45	45	43	41	
29	0	6	12	18	24	29	33	37	40	42	44	45	45	44	41	

TABLE XXXV.

Augmentation of the ☽'s Semidiameter.

Argument—*True Zenith Distance* Z.

Z	For P = 54′	Var. for 10′ in P.	Z	For P = 54′	Var. for 10′ in P.	Z	For P = 54′	Var. for 10′ in P.
°	″	″	°	″	″	°	″	″
0	14·0	5·7	30	12·1	4·9	60	6·9	2·9
1	14·0	5·7	31	12·0	4·8	61	6·7	2·8
2	14·0	5·7	32	11·9	4·8	62	6·5	2·7
3	14·0	5·7	33	11·7	4·7	63	6·2	2·6
4	14·0	5·7	34	11·6	4·7	64	6·0	2·5
5	13·9	5·7	35	11·5	4·7	65	5·8	2·4
6	13·9	5·7	36	11·3	4·6	66	5·6	2·3
7	13·9	5·7	37	11·2	4·6	67	5·4	2·2
8	13·8	5·7	38	11·0	4·5	68	5·2	2·1
9	13·8	5·7	39	10·8	4·4	69	4·9	2·0
10	13·8	5·6	40	10·7	4·4	70	4·7	1·9
11	13·7	5·6	41	10·5	4·3	71	4·5	1·8
12	13·7	5·6	42	10·3	4·3	72	4·2	1·7
13	13·6	5·6	43	10·2	4·2	73	4·0	1·6
14	13·6	5·5	44	10·0	4·1	74	3·8	1·5
15	13·5	5·5	45	9·8	4·1	75	3·5	1·4
16	13·4	5·5	46	9·7	4·0	76	3·3	1·3
17	13·4	5·4	47	9·5	3·9	77	3·1	1·2
18	13·3	5·4	48	9·3	3·9	78	2·8	1·1
19	13·2	5·4	49	9·2	3·8	79	2·6	1·1
20	13·1	5·4	50	9·0	3·7	80	2·4	1·0
21	13·0	5·4	51	8·8	3·6	81	2·1	0·9
22	12·9	5·3	52	8·6	3·5	82	1·9	0·8
23	12·8	5·3	53	8·4	3·4	83	1·7	0·7
24	12·7	5·3	54	8·2	3·3	84	1·4	0·6
25	12·6	5·2	55	8·0	3·2	85	1·2	0·5
26	12·5	5·1	56	7·8	3·2	86	1·0	0·4
27	12·4	5·1	57	7·5	3·1	87	0·7	0·3
28	12·3	5·0	58	7·3	3·1	88	0·5	0·2
29	12·2	4·9	59	7·1	3·0	89	0·3	0·1
30	12·1	4·9	60	6·9	2·9	90	0·0	0·0

TABLE XXXVI.

Sidereal Equivalents,

For converting Intervals of Mean Solar Time into Equivalent Intervals of Sidereal Time.

Hours				Minutes				Minutes				Seconds			
Hours of Mean Time.	Equivalents in Sidereal Time.			Minutes of Mean Time.	Equivalents in Sidereal Time.			Minutes of Mean Time.	Equivalents in Sidereal Time.			Seconds of Mean Time.	Equivalents in Sidereal Time.	Seconds of Mean Time.	Equivalents in Sidereal Time.
	h.	m.	s.		m.	s.			m.	s.			s.		s.
1	1	0	9·86	1	1	0·16		31	31	5·09		1	1·00	31	31·08
2	2	0	19·71	2	2	0·33		32	32	5·26		2	2·01	32	32·09
3	3	0	29·57	3	3	0·49		33	33	5·42		3	3·01	33	33·09
4	4	0	39·43	4	4	0·66		34	34	5·59		4	4·01	34	34·09
5	5	0	49·28	5	5	0·82		35	35	5·75		5	5·01	35	35·10
6	6	0	59·14	6	6	0·99		36	36	5·91		6	6·02	36	36·10
7	7	1	9·00	7	7	1·15		37	37	6·08		7	7·02	37	37·10
8	8	1	18·85	8	8	1·31		38	38	6·24		8	8·02	38	38·10
9	9	1	28·71	9	9	1·48		39	39	6·41		9	9·02	39	39·11
10	10	1	38·56	10	10	1·64		40	40	6·57		10	10·03	40	40·11
11	11	1	48·42	11	11	1·81		41	41	6·74		11	11·03	41	41·11
12	12	1	58·28	12	12	1·97		42	52	6·90		12	12·03	42	42·12
13	13	2	8·13	13	13	2·14		43	43	7·06		13	13·04	43	43·12
14	14	2	17·99	14	14	2·30		44	44	7·23		14	14·04	44	44·12
15	15	2	27·85	15	15	2·46		45	45	7·39		15	15·04	45	45·12
16	16	2	37·70	16	16	2·63		46	46	7·56		16	16·04	46	46·13
17	17	2	47·56	17	17	2·79		47	47	7·72		17	17·05	47	47·13
18	18	2	57·42	18	18	2·96		48	48	7·89		18	18·05	48	48·13
19	19	3	7·27	19	19	3·12		49	49	8·05		19	19·05	49	49·13
20	20	3	17·13	20	20	3·29		50	50	8·21		20	20·05	50	50·14
21	21	3	26·99	21	21	3·45		51	51	8·38		21	21·06	51	51·14
22	22	3	36·84	22	22	3·61		52	52	8·54		22	22·06	52	52·14
23	23	3	46·70	23	23	3·78		53	53	8·71		23	23·06	53	53·15
24	24	3	56·56	24	24	3·94		54	54	8·87		24	24·07	54	54·15
				25	25	4·11		55	55	9·04		25	25·07	55	55·15
				26	26	4·27		56	56	9·20		26	26·07	56	56·15
				27	27	4·44		57	57	9·36		27	27·07	57	57·16
				28	28	4·60		58	58	9·53		28	28·08	58	58·16
				29	29	4·76		59	59	9·69		29	29·08	59	59·16
				30	30	4·93		60	60	9·86		30	30·08	60	60·16

TABLE XXXVII.

Divisors for obtaining the Correction on account of Second Differences.

(*a*.) Succession, *Units*.			(*b*.) Succession, *Days*.					(*c*.) Succession, *Hours*.		
Interval.		Divisor.	Interval.				Divisor.	Interval.		Divisor.
			h.	m.	h.	m.		m.	m.	
·00	1·00	∞	0	0	24	0	∞	0	60	∞
·01	0·99	202·0	0	20	23	40	146	1	59	122
·02	·98	102·0	0	40	23	20	74·1	2	58	62·1
·03	·97	68·7	1	0	23	0	50·1	3	57	42·1
·04	·96	52·1	1	20	22	40	38·1	4	56	32·1
·05	·95	42·1	1	40	22	20	30·9	5	55	26·2
·06	·94	35·5	2	0	22	0	26·2	6	54	22·2
·07	·93	30·7	2	20	21	40	22·8	7	53	19·4
·08	·92	27·2	2	40	21	20	20·2	8	52	17·3
·09	·91	24·4	3	0	21	0	18·3	9	51	15·7
·10	·90	22·2	3	20	20	40	16·7	10	50	14·4
·11	·89	20·4	3	40	20	20	15·5	11	49	13·4
·12	·88	18·9	4	0	20	0	14·4	12	48	12·5
·13	·87	17·7	4	20	19	40	13·5	13	47	11·8
·14	·86	16·6	4	40	19	20	12·8	14	46	11·2
·15	·85	15·7	5	0	19	0	12·1	15	45	10·7
·16	·84	14·9	5	20	18	40	11·6	16	44	10·2
·17	·83	14·2	5	40	18	20	11·1	17	43	9·85
·18	·82	13·6	6	0	18	0	10·7	18	42	9·52
·19	·81	13·0	6	20	17	40	10·3	19	41	9·24
·20	·80	12·5	6	40	17	20	9·97	20	40	9·00
·21	·79	12·1	7	0	17	0	9·68	21	39	8·79
·22	·78	11·7	7	20	16	40	9·43	22	38	8·61
·23	·77	11·3	7	40	16	20	9·20	23	37	8·46
·24	·76	11·0	8	0	16	0	9·00	24	36	8·33
·25	·75	10·7	8	20	15	40	8·82	25	35	8·23
·26	·74	10·4	8	40	15	20	8·67	26	34	8·14
·27	·73	10·15	9	0	15	0	8·53	27	33	8·08
·28	·72	9·92	9	20	14	40	8·42	28	32	8·04
·29	·71	9·71	9	40	14	20	8·31	29	31	8·01
·30	·70	9·52	10	0	14	0	8·23	30	30	8·00
·31	·69	9·35	10	20	13	40	8·16			
·32	·68	9·19	10	40	13	20	8·10			
·33	·67	9·05	11	0	13	0	8·06			
·34	·66	8·91	11	20	12	40	8·02			
·35	·65	8·79	11	40	12	20	8·01			
·36	·64	8·68	12	0	12	0	8·00			
·37	·63	8·58								
·38	·62	8·49								
·39	·61	8·41								
·40	·60	8·33								
·41	·59	8·27								
·42	·58	8·21								
·43	·57	8·16								
·44	·56	8·12								
·45	·55	8·08								
·46	·54	8·05								
·47	·53	8·03								
·48	·52	8·01								
·49	·51	8·00								
·50	·50	8·00								

The correction is obtained by dividing the second difference by the "Divisor" found in Table (*a*), (*b*), or (*c*), and it is always to be applied with a *contrary sign* to that of the second difference. In some cases where precision is required, and the third difference is considerable, it is preferable to use the *mean* second difference, or half the sum of the two second differences that stand opposite to the quantities between which the interpolation is made.

No.	Designation.		Natural Number.	Logarithm.	Comp. Logarithm.
1	Circumference, diam. *unity*.....π	=	3.14159265	0.4971499	9.5028501
2	Area of circle „ „ .....$\frac{1}{4}\pi$	=	0.78539816	9.8950899	0.1049101
3	Solidity of sphere „ „ .....$\frac{1}{6}\pi$	=	0.52359878	9.7189986	0.2810014
4	Area of circle, circum. *unity*.....$\frac{1}{4\pi}$	=	0.07957747	8.9007902	1.0992098
5	π^2	=	9.86960440	0.9942997	9.0057003
6	$\sqrt{\pi}$	=	1.7724539	0.2485749	9.7514251
7	hyp. log. π	=	1.1447299	0.0587030	9.9412970
8	Arc same length as radius.....	=	57°.29577951	1.7581226	8.2418774
9		=	3437.74677	3.5362739	6.4637261
10		=	206264″.81	5.3144251	4.6855749
11	Length of arc 1°	=	0.01745329	8.2418773	1.7581227
12	Length of arc 1′	=	0.0002908882	6.4637261	3.5362739
13	Length of arc 1″ ....sin 1″	=	0.0000048481368	4.6855749	5.3144251
14	360° in seconds.....	=	1296000″	6.1126050	3.8873950
15	24 hours in seconds	=	86400s.	4.9365137	5.0634863
16	12 hours in seconds.....	=	43200s.	4.6354837	5.3645163
17	3 hours in seconds..	=	10800s.	4.0334238	5.9665762
18	1 hour in seconds.....	=	3600s.	3.5563025	6.4436975
19	Modulus of common log.....	=	0.434294482	9.6377843	0.3622157
20	Number whose hyp. log. is *unity* .....ε	=	2.718281828	0.4342945	9.5657055
21	hyp. log. 10	=	2.302585093	0.3622157	9.6377843
22	Sidereal day 23h. 56m. 4s. ·09 in mean solar days	=	0.99726967	9.9988126	0.0011874
23	Sidereal year in mean solar days	=	365.25636	2.5625978	7.4374022
24	Tropical year in mean solar days.....	=	365.24224	2.5625810	7.4374190
25	Length of seconds pendulum at London in inches.....	=	39.1393	1.5926130	8.4073870
26	Earth's equatorial radius in English feet	=	20,922,812	7.3206201	2.6793799
27	Earth's equatorial radius in English miles	=	3962.654	3.5979861	6.4020139
28	Earth's polar radius in English feet	=	20,853,232	7.3191734	2.6808266
29	Earth's polar radius in English miles...	=	3949.476	3.5965395	6.4034605
30	Mean degree of latitude in English feet.	=	364565	5.5617750	4.4382250
31	Mean degree of latitude in English miles	=	69.046	1.8391411	8.1608589
32	Degree of equator in English feet.....	=	365172	5.5624974	4.4375026
33	Degree of equator in English miles.....	=	69.1613	1.8398634	8.1601366
34	Ellipticity of the earth.....	=	0.0033256 = $\frac{a-b}{a}$	7.5218643	2.4781357
35	Geographical mile in English feet	=	6076.08	3.7836237	6.2163763
36	English mile in English feet	=	5280	3.7226339	6.2773661
37	Ratio of Nautical to English mile	=	1.15077	0.0609898	9.9390102
38	Acc. force of gravity at London, in feet, g.	=	32.1908	1.5077315	8.4922685
39	Cubic inch of distilled water in grains ..	=	252.458	2.4021892	7.5978108
40	Cubic foot of distilled water in avoird. lbs.	=	62.32106	1.7946348	8.2053652
41	French toise in English feet	=	6.3945925	0.8058129	9.1941871
42	French metre in English feet	=	3.2808992	0.5159929	9.4840071
43	French foot in ditto.....	=	1.0657654	0.0276616	9.9723384
44	French kilogramme in avoird. lbs.....	=	2.20606	0.3436173	9.6563827
45	French gramma in avoird. lbs.....	=	0.00220606	7.3436173	2.6563827
46	French cubic metre in cubic feet	=	35.3166	1.5479787	8.4520213
47	French litre in cubic inches.....	=	61.0276	1.7855261	8.2144739
48	French litre in imperial gallons.....	=	0.22009687	9.3426138	0.6573862
49	French hectore in English acres.....	=	2.471143	0.3928979	9.6071021
50	Imperial gallon in cubic inches	=	277.276	2.4429123	7.5570877

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※ Hence the eccentricity or e = .0814886
and SC or ae = 322.9047865

$120T = S$

$120^{5/3} = A\pi(3.0)^2$

$S = A = 1.918$